BIOLOGICAL EVALUATION
OF THE
COEUR D'ALENE TRIBE WATER QUALITY STANDARDS

FOR THE

U.S. FISH AND WILDLIFE SERVICE

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1 Background Information

1.1 History

Section 518 of the Clean Water Act (CWA) provides a legal framework for tribes to assume the same duties and authorities as states under a particular section of law. Section 518(e) describes the criteria a tribe must meet in order to be eligible for "treatment in the same manner as a state" (also referred to as "treatment as a state" or "TAS"). In accordance with Section 518(e), EPA codified regulations, in the Code of Federal Regulations (CFR) at 40 CFR 131.8, describe the process and criteria for TAS approval. Once EPA approves a tribe's TAS status for a particular program under the CWA, the tribe generally administers that program in the same way as states.

On August 5, 2005 the U.S. Environmental Protection Agency Region 10 (EPA) approved the Coeur d'Alene Tribe (the Tribe) as eligible for TAS. The TAS approval decision grants the Tribe authority to establish water quality standards (WQS) under Section 303 (c) of the CWA and to issue water quality certifications under CWA Section 401 for the Reservation TAS Waters. TAS was granted for only part of the waters within the reservation, including those portions of Coeur d'Alene Lake and St. Joe River that lie within the reservation boundaries, except Heyburn State Park. Other waters within the reservation boundaries are not part of the Reservation TAS Waters. EPA's approval action for the Tribe's WQS and this Biological Evaluation (BE) apply only to the Reservation TAS Waters. Additional information on the Reservation TAS Waters is provided in Section 2.2.

Once a tribe receives TAS approval from EPA, the tribe is expected to develop WQS for the waters covered by the EPA TAS approval in compliance with Section 303(c) of the CWA. WQS developed by a tribe under the CWA undergo public review and comment, as do standards the state develops for its waters. The Tribe has worked with EPA and the Idaho Department of Environmental Quality (IDEQ) to refine the WQS so that they meet the requirements of the CWA and the federal WQS program regulations at 40 CFR 131. Further information on the WQS program is provided in Section 2.3.

In July 2004, the Coeur d'Alene Tribal Council adopted a formal resolution confirming the Tribe's resolve to publish its proposed standards for public review and comment, consistent with federal law, before submitting them to EPA for final approval. If the Tribal WQS are approved by EPA, those WQS would go into effect for CWA purposes on the date of EPA approval.

For CWA Section 401, Water Quality Certification, TAS status gives the Tribe authority to prepare water quality certifications for federal permits and licenses of activities that cause a discharge to the Reservation TAS Waters. As the government agency responsible for CWA Section 401 water quality certifications, the Tribe must follow the procedures established by the EPA regulations found in the Code of Federal Regulations, at 40 CFR Part 121, as each certification is developed.

1.2 EPA's Proposed Action - Approval of the Coeur d'Alene Tribe Water Quality Standards

Pursuant to Section 303(c) of the CWA, states and tribes with TAS status are required to adopt WQS to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. These standards must be submitted to EPA for review and subsequent approval or disapproval. EPA's proposed approval of the Coeur d'Alene Tribe's WQS is the subject of this ESA consultation.

The Tribe's WQS were submitted to EPA and received on June 4, 2010. EPA has reviewed the Tribe's WQS and proposes to approve most of the provisions and many of the water quality criteria. The purpose of this BE is to determine whether the proposed approval action is likely to affect threatened or endangered species that are present in the Reservation TAS Waters. All provisions and criteria related to aquatic life are addressed in this BE. The BE is prepared in accordance with requirements set forth under Section 7 of the Endangered Species Act (ESA) (*16 U.S.C. 1536*).

2 Description of the Action and the Action Area

2.1 Federal Action

The subject of this BE is limited to the Coeur d'Alene WQS provisions that EPA is proposing to approve and that may affect aquatic life. Additionally, the analysis of the effects of the proposed WQS provisions assumes that ESA-listed species and their habitat are exposed to waters meeting the proposed WQS. The following WQS provisions are included in this consultation:

Narrative Criteria:
- General Conditions – Section 3.1
- General Narrative Water Quality Criteria – Section 5
- Toxic Substances – Section 7.1
- Biological Criteria – Section 9
- Wildlife Criteria – Section 10
- Wetlands – Section 11

Toxic Substances – Sections 7.2, 7.3 and 7.6 – 7.8
Water Quality Criteria for Toxic Pollutants – Sections 7.10 and 7.11
Mixing Zones – Sections 12.1 and 12.2(A) and (B)
Allowance for Compliance Schedules – Section 15
Water Use Classification Provisions:
- Water Use Classification – Section 18
- General Classifications – Section 20
- Specific Classifications – Section 21

Specific Water Quality Criteria for Use Classifications – Section 19.

The Coeur d'Alene Tribe's WQS are provided in Appendix A. The Tribe is currently making non-substantive revisions to their WQS and expect to provide these to EPA shortly. The changes do not alter the meaning or intent of the WQS, but provide clarifications and editorial adjustments. The changes will not affect the consultation process or outcome.

Appendix A includes the WQS as originally adopted by the Tribe in 2010. The individual provisions, with the expected changes incorporated, are quoted in this BE in the applicable sections.

2.2 Description of the Action Area

The action area includes two bodies of water within the Coeur d'Alene Reservation (Figure 2.1), approximately the southern third of Coeur d'Alene Lake and the lower portion of St. Joe River. Other waters within the reservation boundaries are not part of the action area. The action area is often referred to as the Reservation TAS Waters in this BE; the terms are synonymous.

The action area consists of the following waters:

Coeur d'Alene Lake–Coeur d'Alene Lake is the largest water resource of the Reservation. The lake is the second largest in Idaho, with a total surface area of 30,177 acres. Approximately one third of the lake lies within Reservation boundaries. The water level in the lake is controlled during the summer months by Avista, the operator of the Post Falls Dam. Summer levels are maintained near full-pool elevation.

St. Joe River–The lower St. Joe River enters the Reservation within the City of St. Maries and passes through a broad floodplain on its way to Coeur d'Alene Lake. Prior to entering the lake, it passes through an extensive natural levee that spans four linear miles and continues into the lake (Figure 2.2).

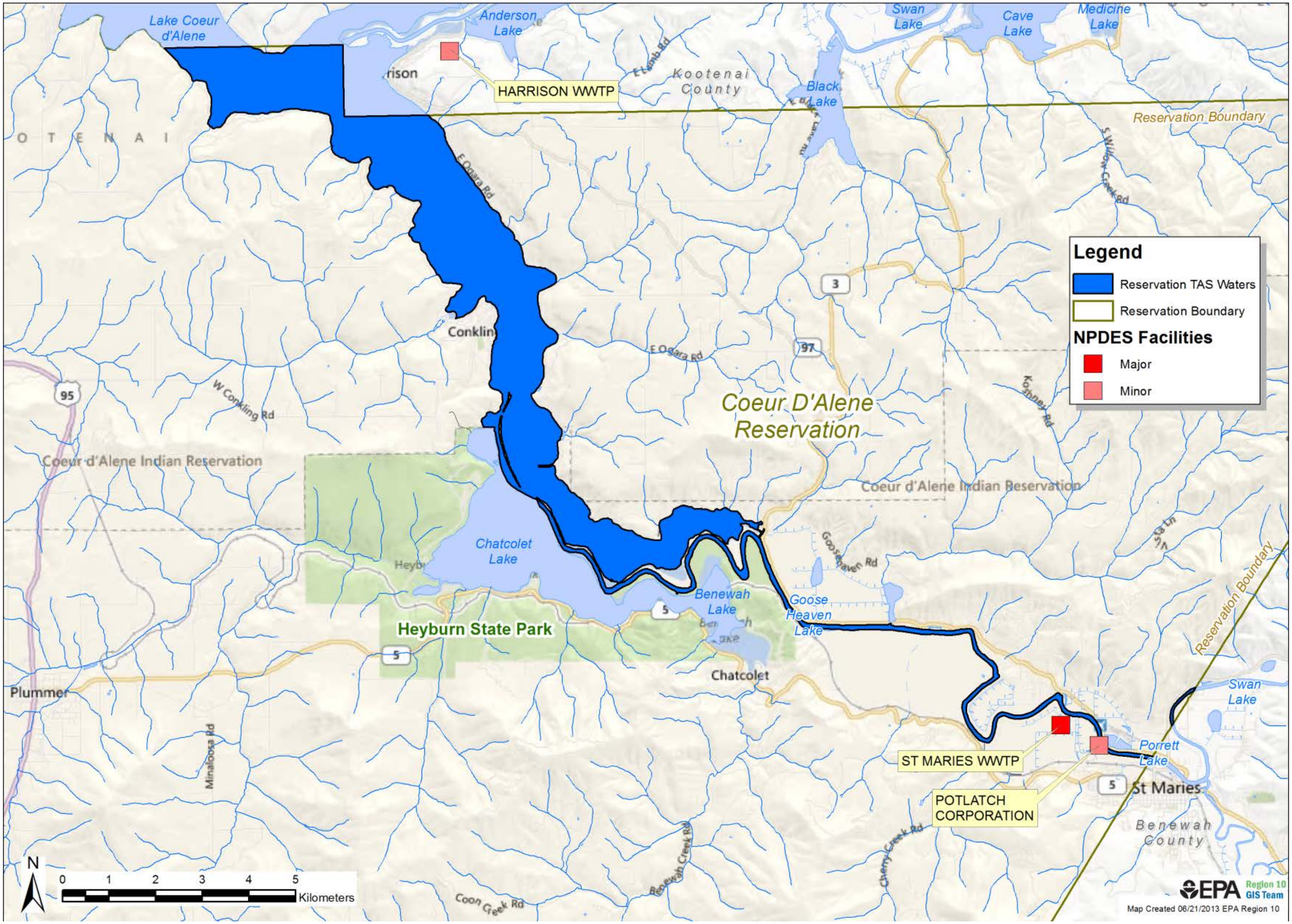


Figure 2.1. Reservation TAS Waters of the Coeur d'Alene Tribe

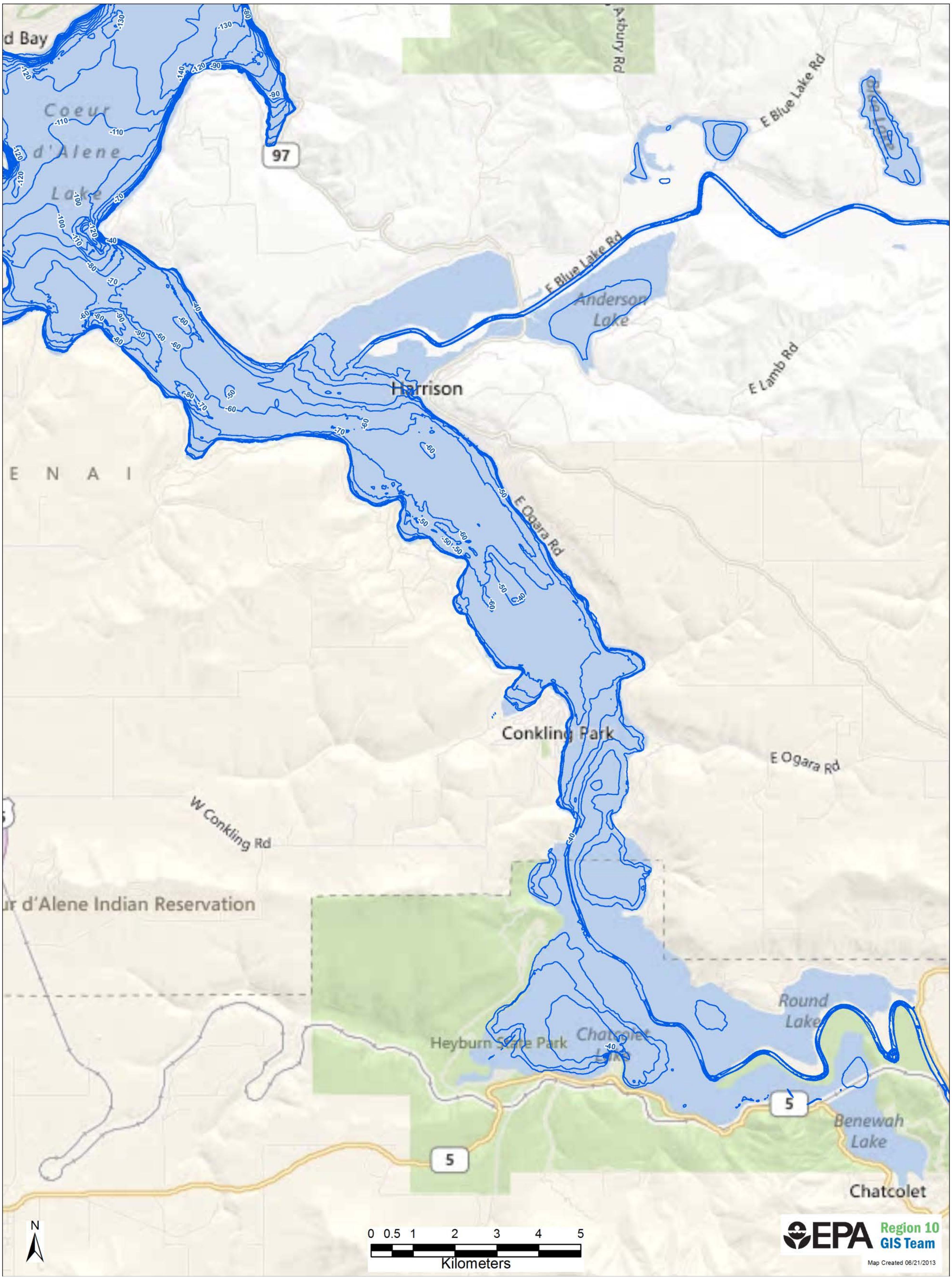


Figure 2.2. Bathymetry of Southern Coeur d'Alene Lake

2.3 Overview of the Water Quality Standards Program

A water quality standard (WQS) defines the water quality goals of a water body by designating the use or uses to be made of the water, by setting criteria necessary to protect the uses, and by preventing degradation of water quality through antidegradation provisions. The CWA provides the statutory basis for the WQS program and defines water quality goals. For example, CWA Section 101(a) states, in part, that wherever attainable, waters should achieve a level of quality that "provides for the protection and propagation of fish, shellfish and wildlife, and provides for recreation in, and on the water" (the "fishable/swimmable" goal of the CWA).

In addition to adopting WQS, states and authorized tribes are required to review and revise their WQS every three years. This public process, commonly referred to as the triennial review, allows for new technical and scientific data to be incorporated into the WQS.

The WQS regulations (40 CFR 131) set forth specifications for the WQS program as well as the minimum requirements for a state/tribal WQS submission to EPA for review and approval. The minimum requirements that must be included in the state/tribal standards are mentioned above: designated uses, criteria to protect the uses, and an antidegradation policy to protect existing uses and high quality waters. In addition to these elements, the regulations allow states/tribes to adopt discretionary policies such as mixing zones and WQS variances. These policies are also subject to EPA review and approval.

States/tribes have the primary responsibility for developing appropriate designated uses. These uses reflect the water quality goal(s) for the water body. The state/tribe then sets water quality criteria for a number of parameters which will provide for a level of water quality in the water body such that the designated uses can be attained and protected. EPA publishes criteria documents as guidance to states/tribes. States/tribes consider these national criteria documents, along with the most recent scientific information, when adopting their regulatory ambient water quality criteria.

Once the standards are officially adopted by the state/tribe, they are submitted to EPA for review and subsequent approval (or disapproval). EPA reviews the standards to determine whether they are consistent with EPA regulations and guidance and whether the designated uses and criteria are protective. EPA then makes a determination whether the WQS meet the requirements of the CWA and 40 CFR 131. EPA then formally notifies the state/tribe of these results. If EPA determines that the WQS are consistent and meet the requirements of the CWA, then EPA approves the standards and they are considered effective for CWA purposes. This means that the WQS can be used, for example, in establishing requirements in National Pollutant Discharge Elimination System (NPDES) permits, Total Maximum Daily Load (TMDL) analyses for impaired waters, and/or CWA Section 404 wetland permits.

If EPA determines that any such revised or new WQS is not consistent with the applicable requirements of the CWA, EPA is required to specify the disapproved portions and the changes needed in order to meet the requirements. The state/tribe is then given an opportunity to make those appropriate changes. If the state/tribe does not adopt the required changes, 40 CFR 131 requires that EPA promulgate federal regulations to replace those disapproved portions of the state/Tribal WQS.

2.4 Overview of the Surface Water Quality Programs in the Coeur d'Alene Reservation TAS Waters

WQS are important for several environmental, programmatic, and legal reasons. Control of pollutants in surface waters is necessary to achieve CWA goals and objectives, including the protection of species dependent upon the aquatic environment. WQS also provide the regulatory framework necessary to identify, protect, and restore the water quality in a state or tribe's surface waters. Clearly established WQS enhance the effectiveness of many of the state, local, and federal water quality programs including point source permitting programs, non-point source control programs, development of TMDLs, and ecological protection efforts.

2.4.1 Surface Water Monitoring

Surface water monitoring activities in the Coeur d'Alene Reservation have focused on beneficial uses and ambient water quality trends. Data from this monitoring is used to document the existence of uses, the degree of use support, and reference conditions. This monitoring is based on the collection of chemical, biological, and physical data. The ambient monitoring network is designed to document water quality trends in Coeur d'Alene Lake. Monitoring data is utilized in evaluating the quality of the Tribe's waters and designing appropriate water quality controls. The 2009 report for the Coeur d'Alene Lake monitoring program (Coeur d'Alene Tribe and IDEQ, 2012) provides the most recent published surface water monitoring data for the Reservation TAS Waters.

2.4.2 National Pollutant Discharge Elimination System Permits Program

EPA develops, issues, and administers NPDES permits to facilities on the reservation. NPDES permits for discharges to Reservation TAS Waters are required to be written consistent with the Tribe's WQS. Prior to the issuance of any permit, EPA evaluates whether the issuance of the permit has the potential to affect listed species pursuant to Section 7 of ESA and initiates ESA consultation with the Services as required.

2.4.3 Total Maximum Daily Loads

Section 303 of the CWA establishes the WQS and TMDL programs. Under Section 303(c), WQS are set by states, territories, and authorized tribes and these jurisdictions are required to develop lists of impaired waters (waters that do not meet WQS). Tribes are not required to develop 303(d) lists and TMDLs unless they also have TAS for Section 303(d). No tribes in Region 10 currently have TAS authority for Section 303(d). Furthermore, EPA doesn't develop 303(d) lists for tribal waters, but sometimes develops TMDLs for tribal waters. The CWA requires that those authorized jurisdictions set priority rankings for the impaired waters listed and then to develop TMDLs for these waters, in order to bring them back into compliance with WQS. EPA must approve or disapprove the 303(d) lists and any TMDLs developed to restore those waters.

TMDLs are developed to address both point source and non-point sources of pollution to waters of the United States. Basically, a TMDL is a "pollution budget" applicable to "impaired" water bodies, and it is developed by calculating the maximum amount of a pollutant that a water body can receive without violating the applicable WQS. A TMDL allocates an amount of pollution to each of the pollutant's sources contributing to that water body. Specifically, a TMDL:

- Provides a written assessment of water quality problems in a particular water body- Identifies the pollutant sources that contribute to the problems
- Establishes pollutant allocations for these sources.

In technical terms, a TMDL is the sum of the allowable loads of a single pollutant from all contributing point and non-point sources. (Point sources are discharges from discrete conveyances. Non-point source pollution usually takes the form of general runoff or seepage.) The calculation must include a margin of safety to allow for any uncertainties in the scientific methods used to derive the TMDL such as water quality modeling assumptions. The calculation must also account for seasonal changes in water quality. Calculations to establish TMDLs are subject to public review. With regard to point sources, all NPDES permits must comply with load allocations developed in a TMDL.

2.4.4 Water Quality Certification (Section 401 of the Clean Water Act)

Under Section 401 of the CWA, a federal agency cannot issue a permit or license for an activity that may result in a discharge to Waters of the U.S. until the state or tribe where the discharge would originate has granted or waived Section 401 water quality certification. CWA Section 401 water quality certification provides states and authorized tribes with an effective tool to help protect water quality, by providing an opportunity to address the aquatic resource impacts of federally-issued permits and licenses. Any conditions required by the state or tribe must be incorporated into the final license or permit, thus ensuring federal agencies comply with state and tribal WQS.

The central feature of CWA Section 401 is the state or tribe's ability to grant, grant with conditions, deny, or waive certification. Granting certification, with or without conditions, allows the federal permit or license to be issued. Denying certification prohibits the federal permit or license from being issued. Granting a waiver allows the permit or license to be issued without state or tribal comment. States and tribes make their decisions to deny, certify, or condition permits or licenses based in part on the proposed project's compliance with EPA-approved WQS. In addition, states and tribes consider whether the activity leading to the discharge will comply with any applicable effluent limitations guidelines, new source performance standards, toxic pollutant restrictions, and other appropriate requirements of state or tribal law.

Examples of federal licenses and permits subject to Section 401 certification include CWA Section 402 NPDES permits in states where EPA administers the permitting program, CWA Section 404 permits for discharge of dredged or fill material issued by the Army Corps of Engineers, Federal Energy Regulatory Commission (FERC) hydropower licenses, and Rivers and Harbors Act Sections 9 and 10 permits for activities that have a potential discharge in navigable waters issued by the Corps. Many states and tribes rely on CWA Section 401 certification to ensure that discharges of dredge or fill material into a Water of the U.S. do not cause unacceptable environmental impacts. More generally, certification is regarded as the primary regulatory tool for protecting wetlands and other aquatic resources. In addition, Section 401 certification is often a state or tribe's only opportunity to review, and appropriately condition or object to, the federal permitting or licensing of a hydroelectric project.

3 Description of the Species

3.1 Species of Concern

Pursuant to the species list update August 17, 2011 provided by the U.S. Fish and Wildlife Service (USFWS) the following threatened and endangered species will be considered in this assessment. This list contains all species currently listed and candidate species under the Endangered Species Act (ESA) for Kootenai and Benewah Counties in the State of Idaho.

Canada Lynx (*Lynx canadensis*) – Threatened
Spalding's Catchfly (*Silene spaldingii*) – Threatened
Water Howellia (*Howellia aquatilis*) – Threatened
Bull Trout (*Salvelinus confluentus*) – Threatened; Designated Critical Habitat

There are a number of species that while listed as threatened or endangered for Kootenai and Benewah Counties in the State of Idaho, due to their habitat requirements, as well as the limited size of the action area and known locations, dietary preferences or limited populations, would not be affected by EPA approval of the Coeur d'Alene Tribe WQS for the TAS Reservation waters. See Figure 2.1 and the description of the Reservation TAS Waters in Section 2.2 of this BE.

Therefore, EPA has determined that approval of the Coeur d'Alene Tribe WQS will have **no effect** on the Canada Lynx, Spaulding's Catchfly, or Water Howellia, as described below in Section 3.2. The only ESA-listed species that may be affected by this approval is the bull trout, discussed in the Section 3.3 of this document.

3.2 Species with No Effect Determinations

Canada Lynx (Lynx Canadensis)
The Canada lynx, the only lynx in North America, is a secretive forest-dwelling cat of northern latitudes and high mountains. It feeds primarily on small mammals and birds, and is especially dependent on snowshoe hare for its prey. Given the isolated areas where Canada lynx are known to occur and that are targeted for recovery, and that their diet is comprised largely of small terrestrial mammals, the exposure of the lynx to water pollutants, either in surface waters or through bioaccumulation through the food chain is unlikely. It is unlikely that there are any Canada lynx within the action area of the proposed approval of the Tribe's WQS (i.e. the Coeur d'Alene Reservation). Therefore, EPA has determined that the proposed approval of the Tribe's WQS will have **no effect** on the Canada lynx or its critical habitat.

Spalding's Catchfly (*Silene spaldingii*)
Spalding's catchfly was first collected in the vicinity of the Clearwater River, Idaho, between 1836 and 1847, and was described by Watson (Watson, 1875) A member of the pink or carnation family, Spalding's catchfly is a long-lived perennial herb with four to seven pairs of lance-shaped leaves and a spirally arranged inflorescence (group of flowers) consisting of small greenish-white flowers. It is typically associated with grasslands dominated by native perennial

grasses, restricted to mesic (not too wet or too dry) grasslands that make up the Palouse region in southeastern Washington, northwestern Montana, and adjacent portions of Idaho and Oregon.

Spalding's catchfly is a terrestrial plant species, found on open grasslands, as noted above, and in deep-soiled valleys. The herb would very rarely, if ever, be exposed to flood waters from waters subject to the Coeur d'Alene Tribe's WQS, as it is unlikely that there is any Spalding's catchfly within the Coeur d'Alene Reservation. Therefore, EPA has determined that the proposed approval of the Tribe's WQS will have **no effect** on the Spalding's catchfly.

Water Howellia (*Howellia aquatilis*)
Water howellia is an annual aquatic plant that grows 10-60 cm tall and completes its entire life cycle in one growing season. Water howellia most frequently occurs in glacial pothole ponds and former river oxbows, where bottom surfaces are firm, consolidated clay and sediments. The plant roots in the bottom sediments of low-elevation ponds or sloughs.

In Idaho, the only known water howellia sites are on the flood plan of the Palouse River, in ponds formed by the gradual migration of the river channel (Lichthardt and Moseley, 2000). Due to the limited populations of water howellia in Idaho and their narrow ecological requirements, there is little potential that this species will occur within the action area. Therefore, EPA has determined that the proposed approval of the Tribe's WQS will have **no effect** on the water howellia.

3.3 Species Assessed for Potential Effects – Bull Trout

Bull trout is the only listed species that may be affected by EPA's approval of the Coeur d'Alene WQS. The bull trout (*Salvelinus confluentus*) was first listed on June 10, 1998. It is currently designated as threatened (64 FR 58909 58933) in the U.S.A., (lower 48 states). Critical habitat was designated in 2005 (70 FR 56212), revised in January 2010, and finalized in October 18, 2010 (75 FR 63898).

3.3.1 Range of Species

Bull trout are members of the char subgroup of the family Salmonidae and are native to waters of western North America. Bull trout range throughout the Columbia River and Snake River basins, extending east to headwater streams in Montana and Idaho, into Canada, and in the Klamath River basin of south-central Oregon. The distribution of populations, however, is scattered and patchy.

3.3.2 Critical Habitat

According to the USFWS, bull trout are listed as "threatened" throughout the coterminous United States, primarily due to habitat threats. In 2008 USFWS completed a 5-year review of bull trout status. USFWS concluded in part that a number of the bull trout Distinct Population Segments (DPS) should be reevaluated and USFWS should consider reclassifying bull trout into separate DPSs. USFWS subsequently recommended not immediately pursuing reclassification due to time and cost constraints. Instead, USFWS identified the following six draft Recovery Units (RUs) (USFWS, September 2010):

- Coastal Recovery Unit
- Klamath Recovery Unit
- Mid-Columbia Recovery Unit
- Columbia Headwaters Recovery Unit
- Upper Snake Recover Unit
- Saint Mary Recovery Unit

The Columbia Headwaters Recovery Unit consists of three critical habitat units (CHU), one of which is the Coeur d'Alene River Basin. According to USFWS, the Coeur d'Alene River Basin CHU is essential to maintaining bull trout distribution within this geographic region of the Columbia Headwaters RU because it represents the most downstream extent of bull trout in the Columbia Headwaters RU. The bull trout population that occurs in this CHU (currently primarily located in the headwaters of the upper Saint Joe River system, which is a major tributary to Coeur d'Alene Lake) has been isolated from other bull trout populations for at least 10,000 years by natural falls on the Spokane River. The Coeur d'Alene River Basin SHU includes the entire Coeur d'Alene Lake basin. A total of 819.6 km (509.3 mi) of streams and 12,606.9 ha (31,152.2 ac) of lake surface area are designated as critical habitat. There are no subunits within the Coeur d'Alene River Basin CHU (USFWS, September 2010). There are 30 water bodies included in the Coeur d'Alene River Basin CHU. The relevant ones for this action are:

- Coeur d'Alene Lake, which provides foraging, migrating and overwintering (FMO) habitat
- St Joe River from its confluence with Coeur d'Alene Lake upstream 151.5 km (94.1 mi) to its confluence with Simmons Creek provides FMO habitat. The upper St. Joe River from its confluence with Simmons Creek upstream 58.9 km (36.6 mi) to Rambikur Falls (just below St. Joe Lake) provides spawning and rearing habitat. The Reservation TAS Waters include the St. Joe River only from its mouth at Coeur d'Alene Lake to the Reservation boundary at the city of St. Marie's.

The USFWS issued a final critical habitat designation for bull trout on October 18, 2010. The October 2010 designation (75 FR 63898) established FMO habitat for Coeur d'Alene Lake and St. Joe River. The Reservation TAS Waters are designated as FMO habitat. FMO habitat is described as: Relatively large streams and mainstem rivers, including lakes or reservoirs, estuaries, and nearshore environments, where subadult and adult migratory bull trout forage, migrate, mature, or overwinter. This habitat is typically downstream from spawning and rearing habitat and contains all the physical elements to meet critical overwintering, spawning migration, and subadult and adult survival needs. Although use of FMO habitat by bull trout may be seasonal or very brief (as in some migratory corridors), it is a critical habitat component.

3.3.3 Life History

Stream-resident bull trout complete their entire life cycle in the tributary streams where they spawn and rear. Most bull trout are migratory, spawning in tributary streams where juvenile fish usually rear from 1 to 4 years before migrating to either a larger river or lake where they spend their adult life, returning to the tributary stream to spawn. Resident and migratory forms may be found together, and either form can produce resident or migratory offspring. Bull trout can grow to more than 20 pounds in lake environments and live up to 12 years. Under exceptional circumstances, they can live more than 20 years (USFWS 2005).

The following summary is based on information provided in EPA reports and USFWS bull trout websites (USFWS, 2006; USFWS, 2010; USFWS, 2011).

Cavendar (1978) identified bull trout *Salvelinus confluentus* as a distinct species of the char subgroup of the Salmonid family, and unique to western North America. Prior to the American Fisheries Society accepting the description of Salvelinus confluentus in 1980, biologists considered bull trout and Dolly Varden, *Salvelinus malma*, the same species (Pratt and Huston, 1993). Bull trout, Dolly Varden, and lake trout are species of char native to the northwest.

Bull trout are a cold-water fish of relatively pristine stream and lake habitats in western North America. Char species, such as bull trout, live farther north than any other group of freshwater fish, except for the Alaskan blackfish, and are well adapted for life in very cold water.

<u>Growth and Juvenile Outmigration</u>
Extensive migrations are characteristic of this species (Fraley and Shepard, 1989). Resident and migratory forms live together, but it is not known if they represent a single population or separate populations (Rieman and McIntyre, 1993). Growth differs little between forms during their first years of life in headwater streams, but diverges as migratory fish move into larger and more productive waters (Rieman and McIntyre, 1993).

Persistence of migratory life history forms and maintenance or re-establishment of stream migration corridors is crucial to the viability of bull trout populations (Rieman and McIntyre, 1993). Migratory bull trout ensure sufficient variability within populations by facilitating the interchange of genetic material between populations. Migratory forms also provide a mechanism for recolonizing local populations extirpated due to natural or anthropogenic effects.

<u>Food</u>
Juvenile bull trout have been found to feed on macroinvertebrates (Shepard et al., 1984; Boag, 1987) and aquatic insects (Scott Deeds, pers. com.) Adult bull trout are primarily opportunistic fish eaters. Prey species available to bull trout in Coeur d'Alene Lake include fish such as kokanee, westslope cutthroat trout, and whitefish (USFWS 2002), and Chinook salmon, brown trout, rainbow trout, yellow perch, and sculpins. Adult bull trout also eat aquatic invertebrates and mysid shrimp (Scott Deeds, pers. com.)

<u>Rearing Habitat</u>
Lake and river dwelling bull trout seek large deep pools with abundant cover in the autumn and winter (Jakober, 1995).

3.3.4 Life Stages Found in the Reservation TAS Waters – Action Area

The predominant life stages of bull trout found in the Reservation TAS Waters are adfluvial subadults and adults that use the lake waters and St. Joe River to forage, migrate, mature, or overwinter (75 FR 63898). Coeur d'Alene Lake and St. Joe River (included in the Reservation

TAS Waters shown on Figure 2.1) have been designated for FMO habitat. Based on USFWS's "*Bull Trout Final Critical Habitat Justification: Rationale for Why Habitat is Essential, and Documentation of Occupancy, Chapter 29. Columbia Headwaters Recovery Unit – Coeur d'Alene River Basin Critical Habitat Unit"*, the Reservation TAS Waters do not support spawning and rearing habitat (USFWS 2010). However, bull trout are present in the Reservation TAS Waters throughout the year (B. Holt, pers. comm. 7/16/12), and bull trout as small as 150 mm may be present in the Reservation TAS Waters (Scott Deeds, pers. com.)

3.3.5 Population Trends and Risks

Bull trout have declined due to habitat degradation and fragmentation, blockage of migratory corridors, poor water quality, past fisheries management, and the introduction of non-native species such as brown, lake and brook trout. While bull trout occur over a large area, their distribution and abundance has declined and several local extinctions have been documented. Many of the remaining populations are small and isolated from each other, making them more susceptible to local extinctions.

Bull trout growth, survival, and long-term population persistence are correlated with stream habitat conditions such as cover, channel stability, substrate composition, temperature, and migratory corridors (Rieman and McIntyre, 1993). These habitat features are impaired as the result of land management activities such as forest harvest, road building, hydropower development, irrigation diversions, mining, and grazing. Additional threats include hybridization and competition with introduced brook trout, predation, isolation, and over-utilization. Many of these factors are outside the scope of the Coeur d'Alene Tribe's WQS. Below is a discussion of some of those factors that are, to some degree, related to water quality within the action area.

Salmonid habitat in the Columbia River Basin has been extensively affected by various land management activities. Timber harvest, road building, and livestock grazing near streams has removed riparian vegetation, changed stream channel morphology, and accelerated soil erosion. Sediment production due to land use practices has been accelerated in sensitive geomorphological formations. On the reservation, sediment loading has increased as a result of widespread logging, road building, and associated activities (Andrews, 1988; Fuller et al., 1985; Petrosky and Holubetz, 1986). Chapman et al. (1991) noted that livestock graze approximately 8 million acres of private and state lands within Idaho. More than 80% of the riparian areas managed by the US Bureau of Land Management (BLM) are in degraded conditions.

The Reservation TAS Waters have been affected by past mining activities at the upstream Bunker Hill facilities, now an EPA Superfund site. Metals-contaminated sediment has been carried down Coeur d'Alene River and deposited on the lake bottom.

According to the USFWS recovery documents, bull trout distribution, abundance, and habitat quality have declined range wide. Bull trout have been functionally extirpated (*i.e.*, few individuals may occur there but do not constitute a viable population) in the Coeur d'Alene River basin in Idaho and in the Lake Chelan and Okanogan River basins in Washington. (Schively et al., 2007; USFWS, 1998).

Bull trout are currently found primarily in the upper portions of the St. Joe River subbasin (PBTTAT, 1998; USFWS, 1998), which contains spawning and rearing habitat. Migratory bull trout also use St. Joe River and Coeur d'Alene Lake as FMO habitat (USFWS 1998).

The Tribe has had a fisheries program since 1990 and has been conducting surveys, population estimates, and other fisheries activities since 1992 (see Section 4.2 of this document). All streams on the Coeur d'Alene Reservation, as well as Coeur d'Alene Lake itself, are managed for native species through fishing regulations and habitat enhancement projects. Management emphasis is placed on westslope cutthroat trout and bull trout. No bull trout harvest has been permitted in the action area or elsewhere in the Coeur d'Alene Reservation since 1995.

Since the early 1990's, the Coeur d'Alene Tribe Fisheries Program has been constructing sediment basins within various watersheds to decrease sediment loading to streams, planting riparian areas to improve cover and shading, installing in-stream habitat structures to improve the pool to riffle ratio, and installing structures for stream bank realignment.

3.3.6 Recovery Plan

The USFWS has developed a draft recovery plan for bull trout in the Columbia River and Klamath, including the Coeur d'Alene Lake Basin Recovery Unit (USFWS 2002). Recovery plans delineate reasonable actions that are believed necessary to recover and protect listed species. The Coeur d'Alene draft recovery plan described the bull trout population status and habitat; defined recovery goals, objectives, and criteria; and outlined actions needed and cost for recovery.

4 Environmental Baseline

4.1 Land Use Activities near Reservation TAS Waters

The action area is part of the Coeur d'Alene Reservation, which covers 345,000 acres in North Idaho. The Reservation lies within the Coeur d'Alene basin. The following information about Coeur d'Alene Lake is provided in the Coeur d'Alene Lake Management Plan (IDEQ and Coeur d'Alene Tribe, 2009):

> Coeur d'Alene Lake is an increasingly popular recreational destination, an economic catalyst for Northern Idaho and Eastern Washington and the heart of the local community. The lake is part of the aboriginal homeland of the Coeur d'Alene Tribe, and their Reservation is located around its southern half. Development along the lake's shoreline has been dramatic in recent years, and it now features multiple resorts and an ever-increasing number of homes. Counties, cities, and towns in the Coeur d'Alene Lake Basin are growing, and the lake is a significant factor in that growth.
>
> As a result of historical mining activity in the Silver Valley, millions of tons of metals contaminated sediments (e.g., zinc, lead, and cadmium) are present on the lake bottom. Other human activities around the basin, such as logging, farming, and home building, contribute sediments and nutrients (phosphorus and nitrogen) into the lake, often as a result of natural events such as snow, rain, and floods. Water quality in the lake has generally improved since the mid-1970s as the era of large-scale upstream mining-related activities tapered off, environmental cleanup activities got underway in the Silver Valley, and environmental regulations were implemented throughout the basin. The challenge today is to ensure that land use activity is managed in ways that will protect the lake's water quality.

The reservation economy is based mostly on its productive agriculture. The Coeur d'Alene Tribe's 6,000-acre farm produces wheat, barley, peas, lentils and canola. The reservation countryside includes about 180,000 acres of forest and 150,000 acres of farmland, most of that farmland owned by private farmers. The reservation land also produces about 30,000 acres of Kentucky Blue Grass. Agricultural practices affecting aquatic habitats include row-crop cultivation, modification and removal of riparian vegetation and dike construction and establishment of drainage districts that modify floodplains. Agricultural activity occurs mainly in the valleys of the lower St. Joe River.

Agricultural practices such as crop production can affect water quality and aquatic habitats by increasing nutrient levels from fertilizers, chemical concentrations from pesticides and sedimentation from bank and channel alterations and by reducing riparian vegetation. Drainage districts along the lower St. Joe have reduced floodplain capacity and habitats accessible to fish. The primary effect of crop production has been increased sedimentation (USFWS 2002).

Logging is another important component of the economy and source of revenue for the Tribe. Only selective cutting of forests is undertaken on tribal land. Clear cuts are banned (Coeur d'Alene Tribal website, accessed 11/2/11). Removal of riparian vegetation has increased stream temperatures and contributed to sedimentation from bank alteration. The legacy of forest management has resulted in streams having both low concentrations of large woody debris and low potential for recruitment of large woody debris. Within the St. Joe subbasin, effects of timber management practices on aquatic habitats are more prevalent in watersheds lower in the system than in watersheds in the upper portion. Current forest management practices have improved, so impacts have been lessened (USFWS 2002).

The St. Maries Creosote Site is located on the edge of the City of St. Maries, Idaho, along the south bank of the St. Joe River. Studies done by the potentially responsible parties and EPA found that sediments, soils and groundwater have been contaminated with creosote from the former wood-pole treating plant. As a part of the cleanup of that site, a wastewater treatment plant (WWTP) is currently under design to treat PAH-contaminated groundwater, sediment dewatering water, and storm water from the site. Creosote is the main contaminant of concern at the site (EPA 2013).

4.2 Tribal Fisheries Management Programs

All streams on the Coeur d'Alene Reservation, as well as Coeur d'Alene Lake itself, are managed for native species through fishing regulations and habitat enhancement projects. Management emphasis is placed on westslope cutthroat trout and bull trout. Since the early 1990's the Coeur d'Alene Tribe Fisheries Program has been constructing sediment basins within various watersheds to decrease sediment loading to stream, planting riparian areas to improve cover and shading, installing instream habitat structures to improve the pool to riffle ratio, and installing structures for stream bank realignment (USFWS 2002).

The Coeur d'Alene Tribe has developed a management plan to enhance resident fish resources within the Reservation. The management plan summarizes all assessment information collected from studies in waters of the Reservation and identifies goals, objective and strategies for the Tribe's Fisheries Program. It outlines a conceptual approach for enhancement activities and provides uniform instructions for planning, implementing, monitoring and evaluating these activities. The Tribe also coordinates its natural resource programs to effectively manage all of its resources. One goal of the Tribe's Wildlife Program is to acquire key pieces of wildlife habitat such as riparian corridors. These riparian corridors will also provide potential habitat for native fish species such as bull trout (USFWS 2002).

The Tribe's WQS set water quality goals for the Reservation TAS Waters. Individual point sources such as the City of St. Maries Wastewater Treatment plant and the Potlatch Corporation's St. Maries log storage and plywood/veneer mill that discharge directly into the Reservation TAS Waters are required to have individual NPDES permits which are issue by EPA. These NPDES permits would include effluent limits based on meeting the Tribe's WQS.

4.3 Coeur d'Alene Tribe's Surface Water Management and Monitoring Program

The Tribe provided the following description of their surface water monitoring program (email from Scott Fields, Water Resource Program Manager, dated January 27, 2011):

> Since time immemorial the Coeur d'Alene Tribe has been stewards of the waters throughout their homeland. This commitment to protect Tribal waters remains strong today. In 2001 the U.S Supreme Court re-affirmed the Coeur d'Alene Tribe's ownership of the Southern 1/3rd of Lake Coeur d'Alene. Lake Coeur d'Alene within the boundaries of the Coeur d'Alene Indian Reservation has water quality concerns including, but not limited to, depletion of dissolved oxygen, presence of high concentrations of heavy metals in the lakebed sediments and water column, toxicity of heavy metals to aquatic life in the lakebed and lake water, sedimentation, reduced water clarity, and excessive growth of aquatic plants. In 2005 the Tribe requested and received Treatment in a Manner Similar to a State (TAS) status for those waters decided upon in the 2001 Supreme Court decision. With this TAS status the Tribe has developed and submitted WQS specific to those waters to EPA. The Tribe is also responsible for issuing CWA Sec. 401 conditions on Federal permits (NPDES). Recently the Tribe and Idaho have completed a new Coeur d'Alene Lake Management Plan (LMP) with the goal of managing nutrients in Lake Coeur d'Alene and the lakes watershed to prevent heavy metals and nutrients from re-mobilizing from the lake sediments.
>
> The Water Resource Program is the primary program within the Tribe tasked with the monitoring of surface waters within and surrounding the Reservation. Types of monitoring conducted by the Water Resource Program include sophisticated limnological studies within Coeur d'Alene Lake utilizing rigorous water quality sampling protocols for the collection and analysis of total and dissolved metals, nutrients, chlorophyll a, phytoplankton and zooplankton. Lake studies also include collection of water column profiles (hydrolab) for temperature, dissolved oxygen, pH, fluorescence, conductivity, and photosynthetic active radiation light.
>
> The Water Resource Program uses an advanced hydrodynamic and ecological model (ELCOM/CAEDYM) to integrate the large amount of data collected by the program. ELCOM/CAEDYM was developed by the University of Western Australia Centre for Water Research and has been refined to include specific chemical and biological processes associated with the heavy metals contamination in the Coeur d'Alene Lake ecosystem. The model is continuously truthed and tuned using the data collected by the Water Resource Program.
>
> The Program also conducts routine and focused monitoring on Reservation streams. Stream sampling includes measurement of stream discharge (flow), water quality sampling for nutrients, total suspended solids as well as collecting similar hydrolab parameters as in our lake sampling (DO, pH, turbidity, conductivity). Stream discharge and water quality measurements are then used to assess if Tribal WQS are being attained and for use in TMDL's and other water quality improvement plans and research.

Ongoing lake monitoring activities completed by the Tribe and IDEQ are described in the 2009 lake management plan (IDEQ and Coeur d'Alene Tribe 2009) and in the 2012 quality assurance project plan addendum (Coeur d'Alene Tribe and IDEQ 2012). Coeur d'Alene Tribe and IDEQ (2012) states, "The primary environmental concern in Coeur d'Alene Lake is the potential for mobilization of contaminants such as arsenic, cadmium, lead and zinc present in its bed sediments if lake bottom waters become depleted in dissolved oxygen as a consequence of eutrophication." The current monitoring program began in 2007 and includes monitoring for metals (arsenic, cadmium, lead, and zinc), nutrients, and basic field measurements 7 to 8 times a year at three locations in the Reservation TAS Waters and at other locations in Coeur d'Alene Lake.

4.4 NPDES Permits

The National Pollutant Discharge Elimination System (NPDES) permit program was created under the federal Clean Water Act to control water pollution. The NPDES program regulates point sources that discharge pollutants into Waters of the U.S. Industrial, municipal, and other facilities must have permits if they discharge pollutants through point sources to surface waters.

An NPDES permit is a legal document that places limits on what can be discharged to waterways. NPDES permits must ensure that the discharge will comply with WQS. They also include monitoring and reporting requirements, and they may include other conditions to make sure the discharge does not adversely affect water quality or people's health. The Tribe's WQS will serve as a basis for establishing effluent limitations for facilities with NPDES permits that are discharging to Reservation TAS Waters. EPA administers the NPDES permit program for all reservation waters.

When EPA renews NPDES permits for discharges upstream of the Reservation TAS Waters, EPA will evaluate whether any changes to effluent limits are necessary in order to avoid violating the downstream (Coeur d'Alene Tribe's) WQS, taking into account dilution that occurs before reaching the Reservation TAS Waters.

The following facilities have NPDES permits within the action area that would be affected directly by Tribal WQS:

> City of St. Maries. The St. Maries municipal wastewater treatment plant discharges treated water to St. Joe River. Its NPDES permit has effluent limits for biological oxygen demand, total suspended solids, pH, bacteria, and total residual chlorine. The permit also includes monitoring requirements for hardness, alkalinity, dissolved oxygen, total phosphorous, total nitrogen, nitrite-nitrate, temperature, and total ammonia. The permit also includes a no discharge limit during the summer to avoid phosphorous impacts to water quality. EPA reissued this permit in 2007.
>
> Potlatch Corporation's St. Maries Plant. The NPDES permit for this facility covers discharges of pollutants to St. Joe River. The facility is owned and operated by the Potlatch Corporation. It is a log storage yard and plywood/veneer mill located at St.

Maries, Idaho. Non-process wastewater is discharged to St. Joe River at River Mile 24. The discharge consists of log yard runoff and noncontact cooling water from power generation and plywood manufacturing processes. The permittee was required to monitor for phosphorus, nitrogen, turbidity, dissolved oxygen, total petroleum hydrocarbons, for one year from January 1997 to December 1997. Ongoing weekly monitoring is required for flow, pH and temperature. The permittee was required to perform chronic toxicity tests using fathead minnow and daphnia in August 2001. This permit was last issued in 1996 and expired in 2001. The permit is currently administratively continued.

4.5 Tribal WQS and Total Maximum Daily Loads (TMDLs)

A TMDL is a "pollution budget" for a water body that is failing to meet the WQS. A TMDL is both a calculation of the maximum amount of a pollutant that a water body can receive and still meet WQS, and an allocation that limits the amount of pollutants that can be discharged from sources.

Two water bodies on the Reservation have been listed under CWA Section 303(d) as impaired by water pollution. Listed water bodies require development of a TMDL that will achieve WQS. For reservation waters, EPA will continue to be responsible for issuing the TMDLs, working closely with the Coeur d'Alene Tribe and the IDEQ. Once the Tribal WQS are approved for Reservation TAS Waters, the TMDLs for waters flowing into Coeur d'Alene Lake and St. Joe River will be prepared to ensure that Tribal WQS are attained in those receiving waters.

Most of the problems in the two listed water bodies relate to sediments and/or nutrients. The Tribe has narrative standards for nutrients and sediments; therefore, EPA, the Tribe, and IDEQ will work together to interpret the Tribe's narrative standards consistently.

4.6 Clean Water Act Section 401 Certifications

The Tribe will also evaluate whether a discharge under a federal license or permit would be consistent with its WQS when granting, denying, or conditioning a water quality certification under Section 401 of the CWA. The Tribe will use its EPA-approved WQS to make certification decisions and will grant, deny, or condition a water quality certification under CWA Section 401.

4.7 Tribal Water Quality Standards and the Clean Water Act

The Tribe's WQS when approved by EPA will provide a comprehensive and consistent framework for protecting the chemical, physical, and biological integrity of all surface waters within the action area, ie., Reservation TAS Waters; establish the basis for regulation of point and non-point sources of pollution; and establish goals for water quality restoration activities. EPA's approval of these WQS will render them effective under the CWA and allow for their use and recognition for water quality management activities. Following EPA's approval, all entities will be required to consider these standards when undertaking any activity that affects waters within the action area. EPA's oversight and permitting responsibilities will ensure that additional ESA consultation will occur as the EPA-approved WQS regulations are implemented in future permits and WQS revisions.

5 Analysis of Effects of EPA's Approval Action to Bull Trout

The ESA Section 7 implementing regulations (50 CFR 402.02) define effects of an action as follows:

> The direct and indirect effects of an action on the species or critical habitat together with the effects of other activities interrelated or interdependent with that action, that will be added to the environmental baseline. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process. Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur (50 CFR 402.02).

Currently, the Reservation TAS Waters are unregulated with respect to WQS, including toxics criteria. The proposed criteria being evaluated in this consultation will provide a level of protection that currently does not exist. In the absence of tribal criteria, EPA generally relies on state criteria for permits that affect tribal waters. With the exception of the chronic criterion for dieldrin, the proposed criteria are the same as, very similar to, or more protective than Idaho's. Regulating waters that were previously unregulated would be of benefit to the listed species.

Direct Effects – For the USEPA action there are no direct effects of consequence to ESA listed bull trout because approving new WQS will not change the environmental baseline or directly affect listed or proposed species.

Indirect Effects – Approving WQS may have indirect effects to listed species when Clean Water Act programs are implemented. These effects are indirect because they are likely to occur later in time when the programs are implemented. CWA programs that may lead to indirect effects include CWA 303(d) listing of impaired waters; development of TMDL management plans, NPDES permits, or CWA 401 certifications of federally licensed projects; and development of nonpoint source pollution management plans designed to meet the WQS over time. These programs are intended to control inputs of both point-source and nonpoint-source pollution to water bodies such that the WQS are met in the receiving waters and aquatic life is protected. Any potential effects to bull trout as described in Section 5 of this document would be considered the indirect effects of EPA's approval action.

Effects from Interrelated Actions – For EPA's proposed approval of the Coeur d'Alene WQS there is no distinction between indirect effects, discussed above, and interrelated actions.

5.1 Narrative Criteria – WQS Sections 3.1, 5, 7.1, 9, 10, 11

5.1.1 Federal Regulation and Guidance

Narrative criteria are statements that describe the desired water quality goal. Narrative criteria apply to all designated uses, at all flows and within mixing zones. The federal WQS regulation requires that states and authorized tribes establish narrative criteria where numerical criteria cannot be established or to supplement numerical criteria [40 CFR 131.11(b)(2)].

5.1.2 Tribe's Narrative Criteria

The Tribe has adopted the following narrative criteria:

<u>General Conditions (Section 3(1))</u>

> *All Reservation TAS Waters shall be free from pollutants in concentrations or combinations that do not protect the most sensitive use of the water body, except as provided for under Mixing Zones (section 12).*

<u>General Narrative Water Quality Criteria (Section 5)</u>

> *All Reservation TAS Waters, including those within designated mixing zones, shall be free from substances attributable to point source discharges, non-point sources, or instream activities in accordance with the following:*
>
> *(1) Floating Solids, Oil and Grease: All waters shall be free from visible oils, scum, foam, grease, and other floating materials and suspended substances of a persistent nature resulting from anthropogenic causes.*
>
> *(2) Color: True color-producing materials resulting from anthropogenic causes shall not create an aesthetically undesirable condition; nor should color inhibit photosynthesis or otherwise impair the existing and designated uses of the water.*
>
> *(3) Odor and Taste: Water contaminants from anthropogenic causes shall be limited to concentrations that will not impart unpalatable flavor to fish, or result in offensive odor or taste arising from the water, or otherwise interfere with the existing and designated uses of the water.*
>
> *(4) Nuisance Conditions: Nutrients or other substances from anthropogenic causes shall not be present in concentrations which will produce objectionable algal densities or nuisance aquatic vegetation, result in a dominance of nuisance species, or otherwise cause nuisance conditions.*
>
> *(5) Turbidity: Turbidity shall not be at a level to impair designated uses or aquatic biota.*
>
> *(6) Bottom Deposits: All Reservation TAS Waters shall be free from anthropogenic contaminants that may settle and have a deleterious effect on the aquatic biota or that will significantly alter the physical and chemical properties of the water or the bottom sediments.*

Toxic Substances (Section 7(1))

(1) Toxic substances shall not be introduced into Reservation TAS Waters in concentrations which have the potential either singularly or cumulatively to adversely affect existing and designated water uses, cause acute or chronic toxicity to the most sensitive biota dependent upon those waters, or adversely affect public health, as determined by the Department, except as allowed for under Mixing Zones.

Biological Criteria (Section 9)

(1) Reservation TAS Waters shall be of sufficient quality to support aquatic biota without detrimental changes in the resident aquatic communities.

(2) Reservation TAS Waters shall be free from substances, whether attributable to point source discharges, nonpoint sources, or instream activities, in concentrations or combinations which would impair the structure or limit the function of the resident aquatic community as it naturally occurs.

(3) The structure and function of the aquatic community shall be measured by biological assessment methods approved by the Department.

(4) Determination of impairment or limitation of the resident aquatic community shall be based on a comparison with the aquatic community found at an appropriate reference site or region.

Wildlife Criteria (Section 10)

Reservation TAS Waters shall be of sufficient quality to protect and support all life stages of resident and/or migratory wildlife species which live in, on, or drink from Reservation TAS Waters.

Water Quality Standards for Wetlands (Section 11)

(1) All wetlands which are considered Reservation TAS Waters, and which are not constructed wetlands, shall be subject to the Narrative Criteria (section 5), Antidegradation (section 6), and Narrative Toxic Substances Criterion (section 7(1)) provisions within this chapter.

(2) Water quality in wetlands which are considered Reservation TAS Waters shall be maintained at naturally occurring levels, within the natural range of variation for the individual wetland.

(3) Physical and biological characteristics shall be maintained and protected by:
(a) Maintaining hydrological conditions, including hydroperiod, hydrodynamics, and natural water temperature variations;
(b) Maintaining the natural hydrophytic vegetation; and
(c) Maintaining substrate characteristics necessary to support existing and designated uses.

(4) Wetlands shall not be used in lieu of stormwater treatment, except as specified by number 7, below. Stormwater shall be treated before discharge to a wetland.

(5) Point and nonpoint sources of pollution shall not cause destruction or impairment of wetlands except where authorized under section 404 of the CWA.

(6) Wetlands shall not be used as repositories or treatment systems for wastes from human sources, except as specified by number 7, below.

(7) Wetlands intentionally created from non-wetland sites for the sole purpose of wastewater or stormwater treatment (constructed wetlands) are not considered "Reservation TAS Waters" and are not subject to the provisions of this section.

5.1.3 Effect of Action on Listed Species

These narrative criteria require that aquatic life be protected in all waters regulated under these standards. Where numeric criteria specific to a site-specific situation have not been developed, these narrative criteria provide a mechanism for the Tribe or EPA to interpret these narrative criteria on a case by case basis and address the specific water quality problem. They are broad in scope so can be used to address the protection of a particularly sensitive species or a unique set of circumstances.

Section 18(4) of the Tribe's WQS provides a water use classification specifically for bull trout. Sections 20 and 21 designate all of the Reservation TAS Waters for protection of bull trout. As a result, the narrative criteria essentially require that all elements of the habitat of bull trout are protected in areas where bull trout are present or where suitable natural habitat is located. Therefore EPA has determined that the narrative criteria may affect but are **not likely to adversely affect** (NLAA) bull trout.

5.2 Toxic Substances – WQS Sections 7.2, 7.3, and 7.6 to 7.8

5.2.1 Federal Regulation and Guidance

EPA's WQS regulations require states and tribes to adopt water quality criteria that will protect the designated uses of a water body. These criteria must be based on sound scientific rationale and must contain sufficient parameters to protect the designated uses. Since 1980, EPA has been publishing criteria development guidelines and national recommended criteria for numerous pollutants. EPA's criteria documents provide a toxicological evaluation of the chemical, tabulate the relevant acute and chronic toxicity information, and derive the acute and chronic criteria that EPA recommends for the protection of aquatic life resources. States and tribes may choose to adopt EPA's recommended criteria or modify these criteria to account for site-specific or other scientifically defensible factors. The aquatic life toxics criteria adopted by the Tribe and addressed in this consultation are consistent with EPA's National Recommended Water Quality Criteria. The chronic criterion for cadmium is more stringent than EPA's recommended criterion.

5.2.2 Tribe's Provisions for Toxic Substances

> *(2) The Department shall employ or require chemical testing, acute and/or chronic toxicity testing, and biological assessments, as appropriate, to evaluate compliance with subsection (1) of this section. Where necessary the Department shall establish controls to ensure that aquatic communities and the existing and designated beneficial uses of waters are being fully protected.*
>
> *(3) Criteria for toxic, and other substances not listed shall be determined with consideration of* USEPA Quality Criteria for Water *found at, EPA-822-H-04-001 December 2004 and other relevant information as appropriate.*
>
> *(6) Criteria for metals shall be applied as dissolved values, except lead and selenium, which are represented as total recoverable.*
>
> *(7) The criteria in the following table shall be applied to all Reservation TAS Waters for the protection of aquatic life and human health.*
>
> *(8) Criteria Maximum Concentration and Criterion Continuous Concentration*
> *The Criteria Maximum Concentration (CMC) is an estimate of the highest concentration of a material in surface water to which an aquatic community can be exposed briefly without resulting in an unacceptable effect. The Criterion Continuous Concentration (CCC) is an estimate of the highest concentration of a material in surface water to which an aquatic community can be exposed indefinitely without resulting in an unacceptable effect. The CMC and CCC are just two of the six parts of an aquatic life criterion; the other four parts are the acute averaging period, chronic averaging period, acute frequency of allowed exceedence, and chronic frequency of allowed exceedence. Because 304(a) aquatic life criteria are national guidance, they are intended to be protective of the vast majority of the aquatic communities in the United States.*

The first provision of the Tribe's Toxic Substances section, Paragraph 7(1), is addressed above in Section 5.1 with the narrative criteria.

Section 7(10) of the Tribe's WQS provides numeric aquatic life criteria that apply to the Reservation TAS Waters, and Section 7(11) provides calculation procedures for hardness-based metals criteria and conversion factors for dissolved and total metals. The criteria are a central feature of the WQS and are addressed in Section 5.3 of this BE.

5.2.3 Effect of Action on Listed Species

Provisions 7(2), 7(3), 7(6), 7(7), and 7(8) outline requirements for implementation and use of numeric criteria for toxic substances. These requirements provide the framework for the use of the criteria and include supporting information and requirements. The provisions do not, of themselves, establish water quality criteria.

The application of these narrative toxic substances provisions is primarily through the issuance of NPDES permits or TMDLs, which is done by EPA for the Coeur d'Alene Tribe. Most of the instances where these toxic substances provisions will be applied will be through these other "agency actions" subject to ESA Section 7 consultation during permit or TMDL development.

Because the toxic substances narrative provisions support the numeric criteria but do not in themselves establish criteria, and because ESA consultation will generally be completed when these provisions are used to implement criteria, EPA has determined that the Coeur d'Alene Tribe's toxic substances narrative provisions may affect but are **not likely to adversely affect** bull trout.

5.3 Toxic Substances: Water Quality Criteria for Toxic Pollutants – WQS Section 7, Paragraphs (10) and (11)

5.3.1 Tribe's Aquatic Life Criteria for Toxic Substances

The Tribe has adopted numeric toxics criteria for all Section 307(a)(1) toxic pollutants for which EPA has recommended aquatic life criteria, consistent with the National Recommended Water Quality Criteria (EPA 2013). These are tabulated in Section 7(10) of the Tribe's WQS (Appendix A).

Section 7(11) of the WQS, *Calculation of Dissolved Metals Criteria*, includes two tables that contain the factors for calculating metals criteria, *Conversion Factors for Dissolved Metals* and *Parameters for Calculating Freshwater Dissolved Metals Criteria that are Hardness-Dependent*.

Section 7(11) specifies that *"The 304(a) criteria for metals, shown as dissolved metals, are calculated in one of two ways. For freshwater metals criteria that are hardness-dependent, the dissolved metal criteria were calculated using a hardness of 100 mg/l as $CaCO_3$ for illustrative purposes only. Freshwater metals' criteria that are not hardness-dependent are calculated by multiplying the total recoverable criteria before rounding by the appropriate conversion factors. The final dissolved metals' criteria in the table are rounded to two significant figures. Information regarding the calculation of hardness dependent conversion factors are included in the footnotes. Actual hardness values found at the time of sampling shall be used in hardness-dependant calculations. High end hardness is capped at 400mg/L and is not capped at the low end."*

The criteria shown in Table 5.1 are included in this ESA consultation.

Table 5.1. Coeur d'Alene Tribe Numeric toxics criteria for protection of aquatic life

Chemical	Acute Criterion (µg/L)	Chronic Criterion (µg/L)
Arsenic	340	150
Cadmium	--	0.25
Chlorine	19	11
Chromium III	570	74
Chromium VI	16	11
Lead (TR)	82	3.2
Nickel	470	52
Selenium (TR)	No criterion adopted	5
Silver	3.2	No criterion adopted
Zinc	120	120
Cyanide	22	5.2
Pentachlorophenol	19	15
Aldrin	3.0	No criterion adopted
Gamma BHC (Lindane)	0.95	No criterion adopted
Chlordane	2.4	0.0043
4,4'-DDT	1.1	0.001
Dieldrin	0.24	0.056
alpha -Endosulfan	0.22	0.056
beta-Endosulfan	0.22	0.056
Endrin	0.086	0.036
Heptachlor	0.52	0.0038
Heptachlor Epoxide	0.52	0.0038
PCBs	No criterion adopted	0.014
Toxaphene	0.73	0.0002

5.3.2 Evaluation Methodology for Toxics Criteria

5.3.2.1 Use of EPA and USFWS Effects Determinations for EPA's Approval Action on Oregon State's 2004 Aquatic Life Criteria Revisions

Many of the toxics criteria adopted by the Coeur d'Alene Tribe are consistent with Oregon's 2004 criteria revisions. An ESA Section 7 consultation was completed between EPA and USFWS regarding EPA's approval of Oregon's 2004 criteria, including evaluation of the effects of the approval action on bull trout. The toxicity assessment approach used in this BE references the analysis and effect determinations in both EPA's BE (2008) and USFWS's BiOp (USFWS 2012) for Oregon's 2004 criteria. For cadmium, this BE references the more recent analysis and effects determination provided in EPA's BE for Idaho's 2006 revision of its cadmium criteria (EPA 2010) and to USFWS's concurrence (USFWS 2011).

This BE follows the initial screen approach used in the Oregon USFWS BiOp to determine a criterion would be NLAA bull trout if there is a very low probability that the bull trout in the action area would be exposed to the pollutant. If there is potential for bull trout in the action area to be exposed to the pollutant, this BE references the analysis and effects determination made by EPA and USFWS in the Oregon consultation for pollutant criterion level.

However, in the Oregon consultation, the toxicity evaluation methodologies and resultant effects determinations made by the EPA in its BE and the USFWS in its BiOp were different for some criteria that also are the subject of this BE of the Tribe's WQS. To the extent that this BE reviews criteria where, in the Oregon consultation, both EPA and USFWS determined NLAA for bull trout in Oregon, EPA concludes in this BE that its approval of the identical Coeur d'Alene Tribe criterion would be NLAA bull trout. For the criteria where EPA concluded NLAA and USFWS concluded likely to adversely affect (LAA) bull trout in Oregon, EPA requests formal consultation on the Tribe's criteria. EPA is following this approach to facilitate ESA consultation for EPA's WQS approval action for the Coeur d'Alene Tribe. By following this approach, however, EPA is not agreeing with the methodology used in the USFWS (2012).

Approaches to effects determinations made by EPA and USFWS and referenced in this BE are summarized below. Table 5.2 provides a summary of determinations and the conclusions for this BE (i.e., NLAA or request formal consultation).

Section 5.3.3 identifies sources of information regarding anthropogenic inputs to the action area, and Section 5.3.4 provides an exposure analysis for the consultation chemicals. Sections 5.3.5 and 5.3.6 address the effects of the action for chemicals with known or potential sources to the action area.

Table 5.2. Coeur d'Alene Tribe Aquatic Life Criteria and Effects on Bull Trout

Chemical[a]	Coeur d'Alene Toxics Criteria		EPA BE determination, Oregon Toxics		FWS BiOp determination, Oregon Toxics		ESA Conclusion for Coeur d'Alene Toxics Criteria	
	CMC (µg/L)	CCC (µg/L)	CMC	CCC	CMC	CCC	CMC	CCC
Chemicals with Known or Suspected Sources to Action Area								
Arsenic	340	150	NLAA	NLAA	insignificant	LAA	NLAA	formal[b]
Cadmium (100 mg/L hardness)	--	0.25	--	NLAA[c]	--	NLAA[c]	--	NLAA[c]
Chlorine	19	11	**	**	**	**	NLAA	NLAA
Chromium III (100 mg/L hardness)	570	74	NLAA	may affect	insignificant	insignificant	NLAA	NLAA
Chromium VI	16	11	NLAA	NLAA	insignificant	discountable	NLAA	NLAA
Lead (total recoverable) (100 mg/L hardness)	82	3.2	NLAA	NLAA	insignificant	LAA[d]	NLAA	NLAA[d]
Nickel (100 mg/L hardness)	470	52	NLAA	NLAA	insignificant	LAA	NLAA	formal[b]
Selenium (total recoverable)	--	5	--	NLAA	--	LAA	--	formal[b]
Silver (100 mg/L hardness)	3.2	--	NLAA	--	insignificant	--	NLAA	--
Zinc (100 mg/L hardness)	120	120	NLAA	NLAA	LAA	LAA	formal[b]	formal[b]
Chemicals without Known or Suspected Sources to Action Area								
Cyanide	22	5.2	**	**	**	**	NLAA	NLAA
Pentachlorophenol	19	15	NLAA	NLAA	NLAA	NLAA	NLAA	NLAA

Chemical[a]	Coeur d'Alene Toxics Criteria		EPA BE determination, Oregon Toxics		FWS BiOp determination, Oregon Toxics		ESA Conclusion for Coeur d'Alene Toxics Criteria	
	CMC (µg/L)	CCC (µg/L)	CMC	CCC	CMC	CCC	CMC	CCC
Legacy Pesticides and PCBs								
Aldrin	3	--	**	--	**	--	NLAA	--
Dieldrin	0.24	0.056	may affect	may affect	NLAA	NLAA	NLAA	NLAA
Gamma BHC (Lindane)	0.95	--	NLAA	--	NLAA	--	NLAA	--
Chlordane	2.4	0.0043	**	**	**	**	NLAA	NLAA
4,4'-DDT	1.1	0.001	**	**	**	**	NLAA	NLAA
Endosulfan (α and β)	0.22	0.056	may affect	may affect	NLAA	NLAA	NLAA	NLAA
Endrin	0.086	0.036	NLAA	NLAA	NLAA	NLAA	NLAA	NLAA
Heptachlor	0.52	0.0038	**	**	**	**	NLAA	NLAA
Heptachlor epoxide	0.52	0.0038	NLAA	NLAA	NLAA	NLAA	NLAA	NLAA
PCBs	--	0.014	--	**	--	**	--	NLAA
Toxaphene	0.73	0.0002	**	**	**	**	NLAA	NLAA

Notes:

-- no criterion was adopted by the Tribe, or for acute cadmium, the criterion is not addressed in this consultation

** this chemical was not addressed in the Oregon toxics consultation

NLAA - not likely to adversely affect

[a] The following criteria were adopted by the Tribe but are not part of this consultation because EPA is not planning to approve them or not planning to act on them at this time: Acute and chronic ammonia, acute cadmium, acute and chronic copper, and acute and chronic mercury.

[b] EPA requests formal consultation for this criterion, based on USFWS's determinations for Oregon's criteria.

[c] The determinations for the chronic cadmium criterion refer to the ESA consultation on the 2006 Idaho cadmium criteria revisions (EPA 2010 and USFWS 2011) rather than the consultation on the Oregon toxics criteria revisions.

[d] The USFWS's LAA determination for the chronic lead criterion is based on reproductive effects to bull trout. The Reservation TAS Waters include only FMO habitat and have no spawning habitat. Therefore, the chronic lead criterion is NLAA bull trout in FMO habitat.

5.3.2.2 EPA and USFWS Approaches to Effects Determinations

5.3.2.2.1 EPA's Approach for the Consultation on Oregon's Revised Toxics Criteria

EPA (2008) used multiple lines of evidence to assess effects of Oregon's revised toxics criteria. The following effects of the criteria on the biological and ecological characteristics of listed species were evaluated:

- Determination of an effects threshold to the listed species and comparison to the criterion
- Evaluation of criterion on prey species (i.e., toxicity to prey species and reduction in prey)
- Evaluation of tissue residues bioaccumulated from multiple routes of exposure, including waterborne and dietary exposure
- Likelihood of exposure to the chemical.

EPA (2008) used a hierarchy of methods to determine effects thresholds for the full complement of chemicals and listed species under consultation for the Oregon toxics revision. Effects thresholds for bull trout in EPA (2008) were determined using Interspecies Correlation Estimate (ICE) modeling for the metals being considered under this consultation.

Final effects determinations in EPA (2008) were based on the findings of each of these evaluations. A "may affect" finding was generated for a criterion when one of the above characteristics yielded a "may affect" conclusion and the potential for exposure existed for the chemical and species under consideration (EPA 2008 p. 5-54). If the potential for exposure was low or non-existent, the criterion was determined NLAA bull trout. This approach is consistent with the approach used by USFWS (2012). However, USFWS (2012) completed the exposure analysis first, and addressed the effects second, as described in the following section. EPA has adopted the USFWS approach for this consultation because it is the more efficient approach. Effects determinations as they apply to the Coeur d'Alene Tribe's aquatic life criteria are provided in Table 5.2.

5.3.2.2.2 USFWS's Approach for the Consultation on Oregon's Revised Toxics Criteria

USFWS (2012) adopted a two-tiered approach for the effects evaluations for Oregon's WQC revisions. An initial screen for exposure potential was conducted to identify chemicals that were likely to be present in areas with ESA-listed species. If co-occurrence of the species and chemical was identified, an effects analysis was completed (USFWS 2012, Figure 4-1). The approach is described in USFWS (2012) in Section 4.1.1.1:

> …where there is very low potential for co-occurrence of listed species with anthropogenic sources of the chemicals in this consultation, we consider the potential for adverse effects to be discountable and USEPA's approval of the criteria to be not likely to adversely affect the particular listed species. Where there are anthropogenic sources of a chemical in listed species habitat, we assume exposure to criteria chemicals at the Criterion Maximum Concentration (CMC) and Criterion Continuous Concentration (CCC). The CMC and CCC represent the basis for administering water quality programs

> under the water quality-based approach to pollution control, including monitoring to determine whether waters are attaining designated uses, 303(d) listing of impaired waters, and the development and implementation of TMDLs. Although we assume exposure to criteria chemicals at the CMC and CCC, we acknowledge that this is the upper end of the concentration a listed species would experience given that NPDES permit limits are based on low flow years and the CMC and CCC have temporal limits (not to be exceeded more than once every 3 years) associated with them. However, information is not available on actual concentrations of criteria chemicals in the aquatic habitats of listed species.

When the potential for exposure to a chemical was identified, an effects analysis was completed. The effects analysis methods are summarized in Section 4.1.1.1 and described in detail in Appendix 1 of the Biological Opinion (USFWS 2012). Effects determinations as they apply to the Coeur d'Alene Tribe's aquatic life criteria are provided in Table 5.2.

5.3.2.2.3 EPA's Approach for the Consultation on Idaho's Revised Cadmium Criteria

The effects evaluation approach taken by EPA for Idaho's cadmium criteria revision (EPA 2010) was similar to EPA's approach for the Oregon toxics (EPA 2008). EPA (2010) considered multiple lines of evidence to arrive at its effects determination, including development of a species mean chronic value (SMCV) based on available acute toxicity data and the acute-chronic ratio (ACR) and the calculated hazard quotient; toxicity to prey species; indirect effects through food chain alterations; and bioaccumulation.

5.3.2.2.4 Effects Analysis for Aquatic Life Criteria Not Addressed in the Oregon Consultation

The Coeur d'Alene Tribe has adopted criteria for several toxic chemicals that were not included in EPA (2008) and USFWS (2012) because revised criteria were not adopted by Oregon for these chemicals. These chemicals include chlorine, cyanide, 5 legacy pesticides, and polychlorinated biphenyls (PCBs). An initial exposure analysis was completed for these chemicals using the approach provided in USFWS (2012). If effects were not found to be insignificant based on exposure considerations, a toxicity evaluation was completed. Of the aquatic life criteria that were not addressed in the Oregon toxics consultation, chlorine is the only chemical that required a toxicity evaluation based on exposure considerations.

5.3.2.2.5 Effects Determination Methods for Chlorine

The toxicity assessment approach used for chlorine references the ecological risk assessment-based analysis and effect determination approaches used in both EPA's 2008 BE for Oregon's 2004 aquatic life criteria (the Oregon Toxics BE), and in recent EPA aquatic life criteria for individual chemicals. The evaluation uses a standard EPA (1998) ecological risk assessment approach that includes the three main phases, problem formulation, analysis, and risk characterization. The chlorine toxicity assessment approach is described in Section 5.3.6 as part of the effects analysis discussion.

5.3.3 Sources of Anthropogenic Chemicals in Reservation TAS Waters

Potential sources of chemicals were identified based on NPDES permits for point source discharges, the Lake Management Plan and Lake Management Reports, review of information on Superfund sites in the region, and land use patterns around waters of the action area to identify possible non-point sources of contaminants. A similar approach was taken in USFWS (2012) for the Oregon WQS revisions. The Coeur d'Alene Lake Management Plan (IDEQ and Coeur d'Alene Tribe, 2009) and periodic lake management reports (e.g., IDEQ and Coeur d'Alene Tribe 2009) provide information and data on conditions in the Reservation TAS Waters.

Lake Management Plan – Coeur d'Alene Lake was listed as impaired for dissolved cadmium, lead, and zinc by the State of Idaho (for State waters) and EPA (for tribal waters), but an Idaho Supreme Court ruling struck down the listing and a TMDL is not currently available. According to the Lake Management Plan, EPA's remedy for the basin functions as a metals implementation plan for the South Fork Coeur d'Alene River and the lake, in lieu of a TMDL. Information from the Lake Management Plan and annual management reports are used to assess metals and other inorganic chemicals in the lake.

NPDES permits – Two NPDES-permitted facilities discharge into Reservation TAS Waters. Both are located in the city of St. Maries, on St. Joe River. Permitted effluent limitations for these facilities include pH, temperature (thermal loading), biological oxygen demand (BOD), total suspended solids (TSS), *E. coli* bacteria, total residual chlorine, and ammonia. Effluent and/or surface water monitoring is required for additional chemical and physical parameters, including hardness, alkalinity, dissolved oxygen, various nutrients, TSS, and total petroleum hydrocarbons. Effluent toxicity testing is also required.

The City of Plummer's NPDES-permitted wastewater treatment plant discharges to Plummer Creek, which flows into Chatcolet Lake. Chatcolet Lake is part of Coeur d'Alene Lake, but is west of the Tribe's jurisdictional waters.

A WWTP at Harrison discharges a small volume of effluent (8,000 to 9,000 gallons per day) to Anderson Slough, which is adjacent to Anderson Lake with limited water exchange with the lake (Bob Poole, pers. com.) Anderson Lake is adjacent to Coeur d'Alene River, which flows into Coeur d'Alene Lake at Harrison. It is not likely that the permitted discharge from the Harrison WWTP affects the action area given the limited exchange of water between Anderson Slough and Anderson Lake, and between Anderson Lake and Coeur d'Alene River. In addition, the volume of discharge from the Harrison WWTP is insignificant relative to the flow of Coeur d'Alene River, which had an average annual mean flow of 1,380 ft^3/s for water years 2005-2012 (USGS 2013). The permitted outfall from this treatment plant is not likely to affect bull trout in the action area and the plant is not considered further in this BE.

The Tribe's WQS include criteria for ammonia and chlorine, and exposure to these chemicals cannot be ruled out based on the NPDES permits. The criteria for ammonia are not under consultation. Chlorine is short-lived in the environment and is likely to be present in only a small area near the outfall of the permitted discharge, and exposure of bull trout to chlorine is expected to be minimal. Residual chlorine is less labile than chlorine and may present a source of exposure to bull trout. Chlorine toxicity is evaluated in Section 5.3.6

Mining sites – The 2009 Lake Management Report (IDEQ and Coeur d'Alene Tribe, 2009, p. 5) provides the following history and status relative to mining activities that affect Coeur d'Alene Lake:

> From the late 1880s to the early 1980s, the "Silver Valley" was the nation's largest producer of silver, lead, zinc and other metals. The mining and ore-processing methods used to extract this wealth produced large quantities of waste material containing toxic or environmentally hazardous substances such as cadmium, lead, and zinc. Much of this material was directly discharged to, or washed into the South Fork of the Coeur d'Alene River and its tributaries. The beds, banks and floodplains of the Coeur d'Alene River, Coeur d'Alene Lake, and to a lesser extent the Spokane River, contain vast quantities of metals-contaminated sediments that continue to be transported downstream and dispersed by hydrologic processes and floods in the basin. An estimated 75 million metric tonnes of trace-element rich sediments from mining-related activities have been deposited into the lake since the late 19th century…

Given the mining history and sediment loading of metals, particularly from the Bunker Hill Superfund Site, a pathway exists for bull trout exposure to anthropogenic metals. The protectiveness of the criteria for the consultation metals is addressed in Section 5.3.5.

Additional potential sources of contaminants – The Lake Management Plan provides a summary of additional activities that may result in the release of contaminants to Reservation TAS Waters:

> Other human activities around the basin, such as logging, farming, wastewater treatment and home building, contribute sediments and nutrients (phosphorous and nitrogen) into the lake, often as a result of natural events such as snow, rain, and floods. Development along the lake's shoreline has changed dramatically in recent years, and features multiple resorts and an ever-increasing number of homes.

Farming and residential development can contribute nutrients and metals to the Reservation TAS Waters via runoff carrying agricultural amendments and from septic systems and storm water runoff. Chemicals under consultation that may be present as a result of land use activities around the Reservation TAS Waters include metals such as cadmium, lead, nickel, and zinc.

5.3.4 Bull Trout Exposure to Chemicals in the Action Area

The approach used in USFWS (2012) was to evaluate the potential for exposure as the first step of the toxics assessment. If no sources of exposure were identified within the range of the listed species, an NLAA determination was made, as described in Section 4.1.1.1 (USFWS 2012):

> …where there is very low potential for co-occurrence of listed species with anthropogenic sources of the chemicals in this consultation, we consider the potential for

> adverse effects to be discountable and USEPA's approval of the criteria to be not likely to adversely affect the particular listed species.

Exposure considerations for legacy pesticides, PCBs, pentachlorophenol, and cyanide are provided in this section.

5.3.4.1 Legacy Pesticides

USFWS determined that all of the legacy pesticides addressed in the Oregon consultation were not likely to adversely affect bull trout based on the exposure analysis. The following summary of the rationale for this determination is provided in USFWS (2012, pp 147-148):

> The pesticides dieldrin, endrin, endosulfan, heptachlor epoxide (alpha and beta), and lindane are no longer approved for use on a widespread scale. Aside from very specialized use of lindane (pharmaceutical treatment of lice/scabies) and heptachlor epoxide (fire ant control in underground power transformers), uses of these pesticides have been cancelled or phased out. Due to the persistent nature of these chemicals, there may be areas where they have concentrated and continue to exist as is identified by contamination noted in either NPDES permits or 303(d) listings. However, these identified stream segments have very limited overlap with listed species and their habitats. In addition, these chemicals most commonly persist in sediments, which are not being considered in this consultation. The effects from these legacy chemicals to listed species are considered to be insignificant or discountable and therefore we determine that the freshwater, saltwater, acute and chronic criteria for dieldrin, endrin, endosulfan, heptachlor epoxide (alpha and beta) and lindane are NLAA all species and their designated or proposed critical habitat considered in this consultation.

The same line of reasoning is used to assess effects to bull trout in the action area. The assessment applies to effects of the legacy pesticides addressed by the Oregon consultation and to the additional legacy pesticides that are part of the Tribe's aquatic life criteria. The additional pesticides include aldrin, chlordane, 4,4'-DDT, heptachlor, and toxaphene.

Neither the Reservation TAS Waters nor adjacent waters are 303(d)-listed for any of the legacy pesticides, and none of the three NPDES permits for discharges into or adjacent to Reservation TAS Waters include limits or monitoring requirements for legacy pesticides. Legacy pesticides have not been of concern in connection with the St. Marie's Creosote Superfund Site or the Bunker Hill mining site. Any legacy pesticides present in the Tribe's waters would be the result of historic use and concentrations would be declining. No continuing sources are anticipated. All of the legacy pesticides sorb strongly to soil and have limited solubility in water. Any residual pesticides present in the Reservation TAS Waters as a result of historic use would be associated with the sediment, which is not addressed by the WQS.

Based on this limited potential for exposure of bull trout to the legacy pesticides, the acute and chronic criteria for the legacy pesticides are **not likely to adversely affect** bull trout.

5.3.4.2 Polychlorinated Biphenyls

PCBs are a family of legacy chemicals that were produced in the U.S. from 1929 until they were banned in 1979 (EPA 2012). Most commercial PCBs sold in the U.S. were produced under the trade name Aroclor (ATSDR 2000). PCBs have been used as coolants and lubricants in transformers, capacitors, and other electrical equipment, and for a variety of other products. Environmental PCB levels have generally decreased since PCB production was ended (ASTDR 2000).

Although PCB-containing transformers are still in use in the U.S., regulations are in place to prevent or minimize the release of PCB oils from transformers to the environment (http://www.epa.gov/epawaste/hazard/tsd/pcbs/laws.htm). PCBs are not identified in any NPDES permits that are in or adjacent to the Tribe's waters, and EPA is not aware of any PCB spills that affect the lake. PCB levels in Spokane River do not meet water quality criteria in Washington State and in the Spokane Tribe's waters and NPDES permits require monitoring for PCBs. However, these permitted discharges occur downstream of the Coeur d'Alene Lake.

No permitted discharges of PCBs to Coeur d'Alene Lake are known, and the lake is not 303(d) listed for PCBs. PCBs in lake and river systems are strongly associated with sediment and have very low solubility in water. Based on the limited potential for exposure of bull trout to PCBs, EPA approval of the acute and chronic criteria for PCBs is **not likely to adversely affect** bull trout.

5.3.4.3 Cyanide

Compounds containing cyanide are used in many industrial processes and can be found in a variety of effluents, such as those from the steel, petroleum, plastics, synthetic fibers, metal plating, mining, and chemical industries (EPA 1985). Non-point sources of cyanide include agricultural and road runoff and atmospheric deposition (ATSDR 2006).

No cyanide-generating industries are located in the vicinity of the Coeur d'Alene Tribe's waters. A search of the EPA Toxics Release Inventory (TRI) database (http://www.epa.gov/tri/tridata/index.html; accessed April 24, 2013) yielded no records of cyanide releases in Benewah and Kootenai Counties. No industrial processes were used at the Bunker Hill Mining and Metallurgical Complex that would have generated a cyanide waste stream (Bill Adams, pers. com.). Cyanide is not a chemical of concern in Tribal waters (Scott Fields, pers. com.) and it is not monitored as part of the Lake Monitoring Program (IDEQ and Coeur d'Alene Tribe, 2009).

Based on the limited potential for exposure of bull trout to cyanide, EPA approval of the acute and chronic criteria for cyanide is **not likely to adversely affect** bull trout.

5.3.4.4 Pentachlorophenol

For the past 30 years, PCP has only been registered for use by certified applicators. Currently, the only registered use of pentachlorophenol is as a heavy duty wood preservative (EPA 2008), although PCP was used in the past as an insecticide (termiticide), fungicide, herbicide, molluscicide, algicide, disinfectant, and as an ingredient in antifouling paint (ATSDR 2001).

PCP is used to treat items such as power-line poles, cross arms, fence posts, railroad ties, and wharf pilings. PCP was not used at any time for wood treatment at the St. Marie's creosote site by the St. Joe River (H. Bottcher, pers. com.), and no NPDES permits in or adjacent to the Reservation TAS Waters include PCP limits or monitoring requirements. A TRI search (4/26/13) yielded no releases of PCP in Kootenai or Benewah Counties.

Based on the limited potential for exposure of bull trout to pentachlorophenol, EPA approval of the acute and chronic criteria for pentachlorophenol is **not likely to adversely affect** bull trout.

5.3.4.5 Metals and Chlorine

Ongoing known or potential sources of metals and chlorine exist for the action area. Coeur d'Alene Lake bed sediments are contaminated with arsenic, cadmium, lead, mercury, silver, and zinc (IDEQ and Coeur d'Alene Tribe 2009, page 16) as a result of historical Bunker Hill mining operations, and metals-contaminated sediment from the Bunker Hill Superfund site continues to accumulate in Coeur d'Alene Lake (Ed Moreen presentation, 10/02/2012). Chromium, nickel, and selenium are not metals of concern at the Bunker Hill site, but the possibility of exposure to these metals is not ruled because of the extensive historical mining activities that took place throughout the Silver Valley area. Agricultural activities and storm water discharges may also contribute metals to the Reservation TAS Waters. Metals effects to bull trout are addressed in the following section.

Permitted discharges of chlorine to Reservation TAS Waters are contributed by the WWTP facility at St. Maries. Chlorine effects to bull trout are addressed in the Section 5.3.6.

5.3.5 Effects to Bull Trout of Chemical Criteria for Metals

Potential or known sources of metals have been identified for the Reservation TAS Waters. The Tribe's aquatic life criteria for metals that are addressed in this consultation include acute and chronic criteria for arsenic, chromium (III), chromium (VI), lead, nickel, and zinc; chronic criteria for cadmium and selenium; and the acute criterion for silver. The criteria for these metals are the same as criteria adopted by Oregon in 2004. The Tribe has adopted criteria for total lead, and Oregon's criteria are for dissolved lead. However, the Tribe's total lead criteria are equivalent to Oregon's dissolved lead criteria after application of the total/dissolved conversion [40 CFR 131.36(b)(2)].

For this BE, EPA is using the effects determinations provided by EPA's BE and USFWS's BiOp for the Oregon toxics criteria as a basis for determining that a criterion is NLAA bull trout or for requesting formal consultation. Determinations made by both agencies for the Oregon toxics consultation and the resultant conclusion for this consultation are provided in Table 5.2. As indicated above in Section 5.3.2.1, for criteria where both EPA and USFWS determined NLAA for bull trout in Oregon, EPA concludes its approval of the Tribe's identical criterion would also be NLAA bull trout in the action area. For criteria where EPA concluded NLAA and USFWS concluded LAA for bull trout in Oregon, EPA requests formal consultation on the Tribe's criteria. EPA is following this approach to facilitate ESA consultation for EPA's WQS approval action for the Coeur d'Alene Tribe. By following this approach, however, EPA is not agreeing with the methodology used in the USFWS (2012).

USFWS (2012) completed an exposure analysis as described above, and found that bull trout in Oregon may be affected by metals based on their co-occurrence with bull trout (Section 4.1.3.2 of the BiOp, *Chemicals with Likely to Adversely Affect Determinations Based on Exposure*.) The effects of the metals are described in USFWS (2012) in Section 4.4.1, *Effects of the Action on Listed Species and Critical Habitats*. The USFWS effects determinations are summarized in Table 5.2 and described briefly below.

To evaluate chronic exposure to metals, USFWS evaluated bull trout reproduction, growth, and survival to the extent toxicity data were available to support each evaluation. The action area includes only FMO habitat and does not support bull trout reproduction. Therefore, conclusions related to bull trout reproduction and early life stages are not applicable to this effects assessment. Further discussion is provided below when reproductive effects are important to the overall effects analysis for a metal. The Tribe's jurisdictional waters support bull trout larger than about 150 mm (Scott Deeds, USFWS, pers. com.)

5.3.5.1 Arsenic

5.3.5.1.1 Acute Exposure

The acute arsenic criterion adopted by the Tribe is 340 µg/L. The same criterion was adopted by Oregon in 2004. EPA (2008) concluded its approval of the Oregon acute arsenic criterion is NLAA bull trout (pages 5-103 to 5-124).

USFWS (2012) developed an effects concentration for juvenile fish that is much higher than the acute criterion. Based on this comparison, USFWS determined that the effect of the acute arsenic criterion would be insignificant to bull trout. The following conclusion was provided (USFWS 2012, page 191):

> …the effects to the bull trout caused by its exposure to the proposed acute criterion for arsenic are likely to be insignificant (i.e., effects that cannot be meaningfully measured, detected, or evaluated) and are not likely to cause the death or injury of exposed bull trout within the action area.

Based on the above analyses, EPA concludes its approval of the Coeur d'Alene Tribe's acute arsenic criterion is **not likely to adversely affect** bull trout.

5.3.5.1.2 **Chronic Exposure**

The chronic arsenic criterion adopted by the Tribe is 150 µg/L. The same criterion was adopted by Oregon in 2004. EPA (2008) concluded its approval of the Oregon chronic arsenic criterion was NLAA bull trout (pages 5-103 to 5-124).

USFWS (2012) determined that exposure to arsenic at the criteria level may result in lethality to juvenile bull trout.

The following summary was provided (USFWS 2012, page 189):

> The chronic arsenic criterion analyzed in this Biological and Conference Opinion is 150 µg/L. Exposure at this criterion was modeled for its effects on growth and survival of bull trout. Bluegill data were used for evaluating both growth and survival effects. This species was used as a surrogate in this analysis for bull trout because there are insufficient chronic toxicity data for bull trout or any other more closely related salmonid. We were unable to obtain toxicity data that was relevant to bull trout reproduction.
>
> *Effects to Bull Trout Growth*
>
> Our modeling results indicate no reduction in growth of bull trout (mean mass) when exposed to the chronic criteria of arsenic (95% confidence limits = 0.00%- 0.00%). There appears to be no direct correlation between chronic arsenic exposure at the proposed criterion and bull trout growth.
>
> *Effects to Bull Trout Survival*
>
> Modeling bull trout exposure to the proposed chronic criterion concentration for arsenic yielded the following result: effects to survival of juveniles in the family Salmonidae (which includes the bull trout) of 5.13% (95% confidence 0.00% – 13.8%, bluegill surrogate) every 3 years during the 25-year term of the proposed action. This translates to a likely mortality to individual bull trout of about 5%.

This conclusion is based on the assumption of constant exposure of juvenile bull trout to arsenic at the criterion concentration of 150 µg/L.

Although EPA's analysis indicates that bull trout exposure to the chronic arsenic criterion is NLAA bull trout, based on the USFWS analysis, EPA is requesting formal consultation on the Coeur d'Alene Tribe's chronic arsenic criterion.

5.3.5.2 Cadmium

5.3.5.2.1 Chronic Exposure

The chronic cadmium criterion adopted by the Tribe is 0.25 µg/L (at 100 mg/L hardness as $CaCO_3$). Idaho adopted new cadmium criteria in 2006, including a chronic criterion of 0.6 µg/L. EPA prepared a BE for the approval of the revised criteria in 2010, and found that the criteria are NLAA bull trout. USFWS provided a concurrence letter in 2011.

EPA (2010) considered multiple lines of evidence in reaching an NLAA conclusion for bull trout. A chronic effects concentration of 2.055 µg/L was calculated based on the species mean acute value (SMAV) and the ACR. This value was greater than Idaho's chronic cadmium criterion of 0.6 µg/L, and is greater than the Tribe's criterion of 0.25 µg/L. In addition, toxicity values for cadmium to prey species or similar surrogate species were higher than Idaho's chronic criterion value and the criterion was not expected to result in a decrease in the availability of prey species. Bioaccumulation of cadmium through prey species was evaluated by estimating tissue residue concentrations for fish and the criterion was again found to be protective. A hazard quotient of 0.71 was calculated for the Idaho chronic cadmium criterion, which is presumed to be adequately protective of bull trout. Cadmium concentrations at the level of Idaho's chronic criterion were also not found to result in significant indirect effects on listed species through food chain alterations.

Based on these lines of evidence, EPA (2010) determined that EPA's approval of Idaho's cadmium criterion was NLAA bull trout. The USFWS concurred with this determination (USFWS 2011). The Tribe's criterion is lower than Idaho's, and would be more protective of bull trout.

Based on the above analyses, EPA concludes its approval of the Coeur d'Alene Tribe's chronic cadmium criterion is **not likely to adversely affect** bull trout.

5.3.5.3 Chromium (III)

5.3.5.3.1 Acute Exposure

The acute chromium (III) criterion adopted by the Tribe is 570 µg/L (at 100 mg/L hardness as $CaCO_3$). The same criterion was adopted by Oregon in 2004. EPA (2008) concluded its approval of the Oregon acute chromium (III) criterion is NLAA bull trout (pages 5-152 to 5-175).

USFWS (2012) developed an LC_{10} for chromium (III) of 1,844 µg/L for juvenile fish. This value is greater than 3 times the acute criterion. However, USFWS did not rule out the possibility of an adverse effect, but concluded that "biological effects are not expected to significantly disrupt bull trout breeding, feeding, or sheltering behavior or cause injury or death of exposed individuals" (USFWS 2012, p. 195).

The Reservation TAS Waters do not include spawning habitat and the most sensitive early life stages are not present in the action area. Based on the above analyses, EPA concludes its approval of the Coeur d'Alene Tribe's acute chromium (III) criterion is **not likely to adversely affect** bull trout.

5.3.5.3.2 Chronic Exposure

The chronic chromium (III) criterion adopted by the Tribe is 74 µg/L. The same criterion was adopted by Oregon in 2004. EPA (2008) concluded its approval of the Oregon acute arsenic criterion may affect bull trout (pages 5-152 to 5-175). However, a more recent evaluation was completed by EPA for its approval action of Oregon's toxics criteria (EPA 2013). This evaluation yielded a genus mean chronic value (GMCV) for the salmonid species Oncorhynchus of 166.3 µg/L. This genus may be used as a surrogate for bull trout. The GMCV is about twice the chronic criterion, which indicates that the chronic chromium (III) criterion is protective of bull trout.

USFWS (2012) determined that effects of exposure to chromium (III) at the criteria level are discountable, based on studies of rainbow trout at the eyed-embryo to egg hatching stage.

The following summary was provided (USFWS 2012, page 197):

> The effects on the bull trout caused by chronic exposure to chromium III are likely to be insignificant and are not likely to cause injury or death of affected individuals based on model results for rainbow trout exposed to the proposed chronic criterion for chromium III.

Based on the above analyses, EPA concludes its approval of the Coeur d'Alene Tribe's chronic chromium (III) criterion is **not likely to adversely affect** bull trout.

5.3.5.4 Chromium (VI)

5.3.5.4.1 Acute Exposure

The acute chromium (VI) criterion adopted by the Tribe is 16 µg/L. The same criterion was adopted by Oregon in 2004. EPA (2008) concluded its approval of the Oregon acute chromium (VI) criterion is NLAA bull trout (pages 5-176 to 5-201).

USFWS (2012) developed an LC_{10} for chromium (VI) of 5,963 µg/L for juvenile fish. This value is much higher than the acute criterion. Based on this comparison, USFWS determined that the effect of the acute chromium (VI) criterion would be insignificant to bull trout. The following summary was provided (USFWS 2012, page 196):

> Because the proposed standard is significantly lower than the LC10, the effects of acute exposure of bull trout to chromium VI are considered insignificant (i.e., effects that cannot be meaningfully measured, detected, or evaluated), as any effects would be indistinguishable from background effects.

Based on the above analyses, EPA concludes its approval of the Coeur d'Alene Tribe's acute chromium (VI) criterion is **not likely to adversely affect** bull trout.

5.3.5.4.2 Chronic Exposure

The chronic chromium (VI) criterion adopted by the Tribe is 11 µg/L. The same criterion was adopted by Oregon in 2004. EPA (2008) concluded its approval of the Oregon chronic chromium (VI) criterion is NLAA bull trout (pages 5-176 to 5-201).

USFWS (2012) determined that exposure to chromium (VI) at the criteria level may reduce growth and survival of juvenile bull trout, based on studies of the related rainbow trout from egg to fingerling size. However, based on exposure considerations, the effects of the chronic chromium (VI) criterion were determined NLAA bull trout.

The following summary was provided (USFWS 2012, page 197):

> …while the modeling presents possible adverse effects to growth (~7%), and reduced survival (~4%) in bull trout at the criterion level, the likelihood of exposure at the proposed chronic criterion is so low that the potential to affect bull trout is discountable.

No sources of chromium (VI) were identified to the action area, based on a review of discharge permits, 303(d) listings, and land use activities described in Section 5.3.3.

Based on the above analyses, EPA concludes its approval of the Coeur d'Alene Tribe's chronic chromium (VI) criterion is **not likely to adversely affect** bull trout.

5.3.5.5 Lead

5.3.5.5.1 Acute Exposure

The Tribe adopted an acute criterion of 82 µg/L for total lead. Oregon's acute lead criterion, 65 µg/L, is for dissolved lead. Both criteria were calculated for a hardness of 100 mg/L as $CaCO_3$. The conversion factor for total and dissolved lead provided by 40 CFR 131.36(b)(2) is 0.791 (also based on 100 mg/L hardness). The Tribe's criterion for total lead is equivalent to Oregon's criterion for dissolved lead, and the effects determinations made for Oregon's lead criteria apply to the Tribe's criteria as well.

EPA (2008) concluded its approval of the Oregon acute lead criterion is NLAA bull trout (pages 5-320 to 5-339).

USFWS (2012) developed an effects concentration for juvenile fish that is much higher than Oregon's and the Tribe's acute lead criteria. Based on this comparison, USFWS determined that the effect of Oregon's acute lead criterion would be insignificant to bull trout (USFWS 2012, page 204).

Based on the above analyses, EPA concludes its approval of the Coeur d'Alene Tribe's acute lead criterion is **not likely to adversely affect** bull trout.

5.3.5.5.2 Chronic Exposure

The Tribe adopted a chronic criterion of 3.2 µg/L for total lead. Oregon's chronic lead criterion, 2.5 µg/L, is for dissolved lead. Both criteria were calculated for a hardness of 100 mg/L as $CaCO_3$. The Tribe's criterion for total lead is equivalent to Oregon's criterion for dissolved lead after application of the conversion factor of 0.791 [40 CFR 131.36(b)(2)].

EPA (2008) concluded its approval of the Oregon chronic lead criterion is NLAA bull trout (pages 5-320 to 5-339).

USFWS (2012) evaluated the acute criterion for lead relative to bull trout reproduction and to survival. No data for any closely related species were found to evaluate bull trout growth.

The USFWS based the LAA conclusion for the chronic lead criterion on reproductive effects. The following evaluation was provided (p. 204):

> *Effects to Bull Trout Reproduction*
>
> Modeling results of brook trout response to lead exposure at the proposed chronic concentration indicate a 3.17% reduction in egg hatching success (95% confidence limits = 0% - 21.7%, brook trout surrogate) every 3 years during the 25-year term of the proposed action. A possible reduction in the egg hatching rate by 3% is difficult to separate from natural background processes. However, another model suggests that chronic exposure to lead at the proposed criterion could cause deformities in 1.15% of individual bull trout exposed, that affect reproduction in hard water conditions (95% confidence limits: 0.03% – 34.0%; rainbow trout surrogate). Thus, adverse effects are likely to result in reduced fitness to adult bull trout (1.15% of exposed individuals) because of possible deformities that affect reproduction in areas where hard water conditions exist; such effects would occur every 3 years during the 25-year term of the proposed action. The risk of this effect occurring may be small but is not discountable. Therefore, chronic exposure of bull trout to lead at the proposed chronic criterion is likely to cause adverse effects to the bull trout (Table 4-12) every 3 years during the 25-year term of the proposed action.

However, the Reservation TAS Waters only includes FMO habitat, and these reproductive endpoints are not applicable to these populations.

USFWS found that exposure to lead would not reduce fish survival. The following text was provided (p. 204):

> Modeling results of brook trout response to the proposed chronic criterion concentration did not reveal a reduction in the survival of juvenile fish. The modeling results indicate no definitive correlation between chronic lead exposure at the proposed criterion level and fish survival. Thus, effects to the survival of bull trout are considered insignificant (i.e., effects that cannot be meaningfully measured, detected, or evaluated) at the proposed chronic criterion.

This conclusion applies to the Coeur d'Alene Tribe's chronic criterion and to the action area.

In addition, EPA (2008) estimated an LC_{50} for bull trout using an ICE model and determined a chronic effects level by applying an acute-chronic ratio. Rainbow trout (*Oncorhynchus mykiss*, a salmonid) was used as a surrogate because no data were available for bull trout or any other species in the *Salvelinus* genus. The chronic effects level was estimated to be 204 µg/L for dissolved lead (EPA 2008, p. 5-326). This value is similar to a no observed effect concentration (NOEC) of dissolved lead reported for brook trout, 213 µg/L (EPA 2008, Table 5.2.12.2, p. 5-325). Both values are much higher than the Tribe's chronic criterion for total lead, 3.2 µg/L.

Based on the above analyses, EPA concludes its approval of the Coeur d'Alene Tribe's chronic lead criterion is **not likely to adversely affect** bull trout.

5.3.5.6 Nickel

5.3.5.6.1 Acute Exposure

The acute nickel criterion adopted by the Tribe is 470 µg/L (at 100 mg/L hardness as $CaCO_3$). Oregon's acute nickel criterion is 468 µg/L. EPA (2008) concluded its approval of the Oregon acute nickel criterion is NLAA bull trout (pages 5-351 to 5-374).

USFWS (2012) developed an effects concentration for juvenile fish that is much higher than the acute criterion and determined that the effect of the acute nickel criterion was likely to be insignificant to bull trout, as follows (USFWS 2012, page 210):

> The LC10 for the bull trout is nearly 9 times higher and an order of magnitude higher than the proposed acute standard for nickel. On that basis, we conclude that the proposed standard would affect … the exposed bull trout population … to such a small extent that those effects are likely to be insignificant (i.e., not meaningfully measured, detected, or evaluated).

Based on the above analyses, EPA concludes its approval of the Coeur d'Alene Tribe's acute nickel criterion is **not likely to adversely affect** bull trout.

5.3.5.6.2 Chronic Exposure

The chronic nickel criterion adopted by the Tribe is 52 µg/L (at 100 mg/L hardness as $CaCO_3$). The same criterion was adopted by Oregon in 2004. EPA (2008) concluded its approval of the Oregon chronic nickel criterion is NLAA bull trout (pages 5-351 to 5-374).

USFWS determined that exposure to nickel at the criteria level may reduce growth and survival of bull trout (USFWS 2012, page 207). Additional effects to bull trout reproduction and survival that were provided by USFWS (2012) involved early life stages. These studies are not applicable to the action area.

Although EPA's analysis indicates that bull trout exposure to the chronic nickel criterion is NLAA bull trout, based on the USFWS analysis, EPA is requesting formal consultation on the Coeur d'Alene Tribe's chronic nickel criterion.

5.3.5.7 Selenium

5.3.5.7.1 Chronic Exposure

The Tribe adopted a chronic criterion of 5 µg/L for total selenium. The same criterion was adopted by Oregon in 2004. EPA (2008) concluded its approval of the Oregon chronic selenium criterion is NLAA bull trout (pages 5-402 to 5-440).

Selenium in natural waters generally exists as hexavalent selenate and tetravalent selenite. The chronic criterion of 5 µg/L is expected to be protective of bull trout exposure via dermal contact to water (USFWS 2012 and EPA 2004). Acute values for most species are greater than 1,000 µg/L. EPA (2004) reports a SMAV for selenite, the more toxic form of selenium, of

10,200 µg/L for brook trout (*Salvelinus fontinalis*). However, selenium is bioaccumulative, and dietary uptake is the main exposure pathway for selenium.

USFWS (2012, p. 335) provided the following determination for the effect of the chronic selenium criterion on bull trout for the Oregon toxics consultation:

> The chronic selenium criterion analyzed in this Biological Opinion is 5 µg/L. Because selenium bio-accumulates we believe that chronic exposure may well have adverse effects to bull trout survival. We estimate that as many as 20% of the juvenile population may be affected. As we have no data on the current number of juvenile bull trout within the action area we will apply this percentage to our estimated number of adults. We realize that this may greatly overestimate the effects, but will give the species the benefit of the doubt in accordance with USFWS policy (USFWS and NMFS 1998).
>
> The possibility of reduced survival exists. The risk of this occurring is considered significant because individual bull trout may be killed.

EPA believes that, due to the added conservatism addressed above without consideration of the frequency and duration components of the criterion (i.e., those that limit the water concentrations to well below the criterion in order to be in compliance) and the use of low flow, high effluent procedures in the permit limit development process, that approval of the chronic selenium criterion is not likely to adversely affect bull trout.

Although EPA's analysis indicates that bull trout exposure to the chronic selenium criterion is NLAA bull trout, based on the USFWS analysis, EPA is requesting formal consultation on the Coeur d'Alene Tribe's chronic selenium criterion.

5.3.5.8 Silver

5.3.5.8.1 Acute Exposure

The acute silver criterion adopted by the Tribe is 3.2 µg/L (at 100 mg/L hardness as $CaCO_3$). The same criterion was adopted by Oregon in 2004. EPA (2008) concluded its approval of the Oregon acute silver criterion was NLAA bull trout (pages 5-441 to 5-463).

USFWS (2012) developed an effects value for juvenile fish that is higher than the acute criterion. However, USFWS did not rule out the possibility of an adverse effect, but stated that "while some adverse effects may occur to the bull trout, these effects are likely to be sub-lethal and not cause a significant disruption of breeding, feeding, migrating, or sheltering behavior…" (USFWS 2012, p. 212).

Based on the above analyses, EPA concludes its approval of the Coeur d'Alene Tribe's acute silver criterion is **not likely to adversely affect** bull trout.

5.3.5.9 Zinc

5.3.5.9.1 Acute and Chronic Exposure

The Tribe has adopted 120 µg/L (at 100 mg/L hardness as $CaCO_3$) as the acute as well as the chronic criteria for zinc. The same value was adopted by Oregon for its acute and chronic criteria. EPA (2008) concluded its approval of the Oregon acute and chronic zinc criteria was NLAA bull trout (pages 5-485 to 5-509).

USFWS (2012) developed an LC_{10} effects value for juvenile fish. This value is lower than the acute and chronic criteria, and USFWS concluded that exposure at the criteria level is likely to result in bull trout mortality (USFWS 2012, p. 214).

USFWS (2012, p. 216) additionally evaluated chronic exposure to zinc at the criterion level and concluded that this level would result in a reduction in growth, as well as survival.

Although EPA's analysis indicates that bull trout exposure to the acute and chronic zinc criteria is NLAA bull trout, based on the USFWS analysis, EPA is requesting formal consultation on the Coeur d'Alene Tribe's acute and chronic zinc criteria.

5.3.6 Effects to Bull Trout of Chemical Criteria for Chlorine

5.3.6.1 Introduction

As discussed in Section 5.3.2.1, many of the toxics criteria adopted by the Coeur d'Alene Tribe are identical to those adopted in Oregon's 2004 criteria revisions. Conclusions of the ESA Section 7 consultation procedure and toxicity assessment methodology used by EPA during its approval of Oregon's 2004 criteria were repeated in this BE for the chemicals where the Tribe and Oregon toxics criteria concentrations are the same. However, no toxics criteria for chlorine were submitted by Oregon in its 2004 criteria submission. EPA is also unaware of any other state or Tribal ESA Section 7 consultations on the EPA (1985) chlorine water quality criteria whose results and conclusions could be repeated and summarized in this BE. Therefore, a full toxicity assessment of chlorine, starting with compilation of the original scientific literature on chlorine toxicity to aquatic life, was performed for this BE.

The toxicity assessment approach used for chlorine within this BE references the ecological risk assessment based analysis and effect determination approaches used in both EPA's BE (2008) for Oregon's 2004 aquatic life criteria (the Oregon Toxics BE), and in the most recent EPA aquatic life criteria for individual chemicals (e.g. Aquatic Life Ambient Water Quality Criteria for Carbaryl – 2012 (EPA 2012)). This BE, as well as both the Oregon Toxics BE (EPA 2008) and current EPA water quality criteria documents (EPA 2013, EPA 2012) perform their evaluations using a standard EPA (1998) ecological risk assessment approach. As this BE evaluates a number of chemicals, much of the information required for an ecological risk-based toxicity assessment of chlorine, for example the life history and dietary preferences of bull trout (Section 3.3), is equally applicable to all chemicals evaluated in the BE. Such information will not be repeated in this section. Instead, reference will be made as needed to appropriate sections of the BE for this chlorine toxicity assessment.

The EPA (1998) ecological risk assessment approach consists of three main phases:

1) Problem formulation
2) Analysis
3) Risk characterization.

Problem formulation is the planning phase of the ecological risk assessment process. Within this BE, problem formulation involves:

- Defining the objectives of the evaluation
- Integrating available information on the stressor of interest
- Identifying assessment endpoints (explicit expressions of valued environmental features to be protected)
- Preparing a conceptual model illustrating the relationships between ecological entities and the stressors to which they are exposed
- Formulating risk hypotheses that describe the assumed relationship between stressors and ecological entities
- Developing an analysis plan describing how data are collected and analyzed
- Providing a description of how risks are to be characterized.

The analysis phase of the ecological risk assessment process follows the analysis plan generated during problem formulation to perform two characterizations: characterization of exposure and characterization of ecological effects. Exposure and ecological effects characterizations focus on the contaminant sources, exposure pathways, and toxic effects most likely to cause adverse effects on the assessment endpoint, as summarized in the conceptual model.

Assessment endpoints and conceptual models help identify measurable attributes to quantify and predict change. However, assessment endpoints and conceptual models often do not identify specific items that can be measured. As an example, a valued environmental attribute to be protected described as survival provides no detail regarding how survival is to be quantified. Therefore, a major goal of the analysis plan generated in problem formulation is to define measures that can be quantified. To complete the example, the survival attribute is evaluated with empirical LC_{50} data generated from laboratory studies of chlorine toxicity to aquatic species. Toxicity data such as LC_{50} values are termed measures of effect in this BE.

EPA (1998) ecological risk assessment guidance identifies three categories of measures that address both sensitivity and likely exposure to stressors:

- **Measures of exposure**: measures of stressor existence and movement in the environment and their contact or co-occurrence with the assessment endpoint.
- **Measures of ecosystem and receptor characteristics:** measures of ecosystem characteristics that influence the behavior and location of entities selected as the assessment endpoint, the distribution of a stressor, and life history characteristics of the assessment endpoint or its surrogate that may affect exposure or response to the stressor.

- **Measures of effect**: measurable changes in an attribute of an assessment endpoint or its surrogate in response to a stressor to which it is exposed.

The analysis plan within the problem formulation phase of ecological risk assessments identifies measures as appropriate for the risk assessment. Detailed descriptions of the information within each of the three categories of measures are presented in the analysis phase of the ecological risk assessment.

The analysis phase of this toxicity assessment presents the available information on exposure, ecosystem and receptor (i.e. bull trout) characteristics, and the toxicological information describing effects that are forwarded to the third phase of the ecological risk assessment process: risk characterization.

Tasks performed within the analysis phase include the following:

- Selection of data that will be used in risk characterization on the basis of their utility for evaluating the risk hypotheses
- Analysis of exposure by examining the sources of stressors, the distribution of stressors in the environment, and the extent of co-occurrence or contact between the stressors and the ecological entities and receptors under evaluation
- Analysis of effects by examining stressor-response relationships, evidence that the stressor causes or is associated with adverse effects on ecological entities
- Evaluate the relationship between measures of effect and assessment endpoints.

The risk characterization phase of the ecological risk assessment process integrates the results of the characterization of exposure and the characterization of ecological effects from the analysis phase to evaluate the likelihood of adverse ecological effects associated with exposure to the stressor. Uncertainties in the risk characterization are discussed and the chemical effect determinations are made for the ESA-listed species.

5.3.6.2 Problem Formulation

5.3.6.2.1 Objective of the Biological Evaluation of the Chlorine Aquatic Life Criteria

The objective of this section of the BE is to determine whether an EPA approval of the Coeur d'Alene Tribe's water quality criteria for chlorine are protective of bull trout. Bull trout is the only federal Endangered Species Act listed fully aquatic species present within the action area for this BE.

5.3.6.2.2 Integration of Available Information on Chlorine

Sources of chlorine to or within the action area are described in Section 5.3.4. The environmental chemistry and fate of chlorine in aquatic systems is complex, and is described in detail in Section 5.3.6.3. The mechanism of toxic action of chlorine is described in the next section.

5.3.6.2.3 Mechanism of Toxic Action of Chlorine

The toxic mechanism(s) of action of residual chlorine to aquatic life are not fully understood, but are likely related to the ability of chlorine to oxidize organic matter. Intracellular enzymes containing sulfhydryl groups are oxidized almost immediately by residual chlorine in both plants and animals. Due to the strength of the chemical bond formed between chlorine and proteins, enzyme activity is irreversibly terminated. This irreversible nature of chlorine reacting with enzymes likely explains the observed irreversible toxicity of chlorine to fish once equilibrium has been lost (Alabaster and Lloyd 1982).

In fish, gills are believed to be the primary site of toxic action of chlorine. This is based on multiple observations of damage to gill epithelium following exposure to chlorine. Cairns et al. (1975) concluded that the mode of toxic action of chlorine to fish is gill tissue damage combined with accumulation of mucus on the gills. The combination of physical damage to gill tissue and coating of gill tissue by mucus inhibits oxygen uptake, resulting in suffocation of the fish.

If the mechanism of toxic action proposed by Cairns et al. (1975) is correct, chlorine is one of the relatively few chemicals that does not require an internally bioaccumulated dose to elicit toxicity to aquatic life. Within this BE, chlorine's mechanism of toxic action has its greatest effect on the conceptual model describing the relationships between, and the multiple routes of exposure section of the risk characterization.

5.3.6.2.4 Assessment Endpoint

EPA (1998) describes assessment endpoints in terms of an ecological entity (e.g. a species, feeding guild or aquatic community) and one or more attributes or characteristics of the ecological entity it is desired to protect. The Oregon Toxics BE (EPA 2008) based its assessment on ecologically relevant toxicological endpoints that could be related to either organism fitness (an organism's ability to perpetuate itself as measured by its reproductive success [Pianka 1983]), or adverse effects at population or higher levels of biological organization. Within the Oregon Toxics BE (EPA 2008), toxicological endpoints that met this ecological relevance guideline were organism survival, reproduction and growth. This is consistent with the approach used to derive aquatic life criteria under the Clean Water Act, which are also based on the survival, reproduction and growth of aquatic species. Within this BE, the only species under evaluation is bull trout.

Under the ecological risk assessment approach used herein, the only assessment endpoints for the evaluation of the chlorine criteria are **survival, reproduction, and growth**.

5.3.6.2.5 Conceptual Model

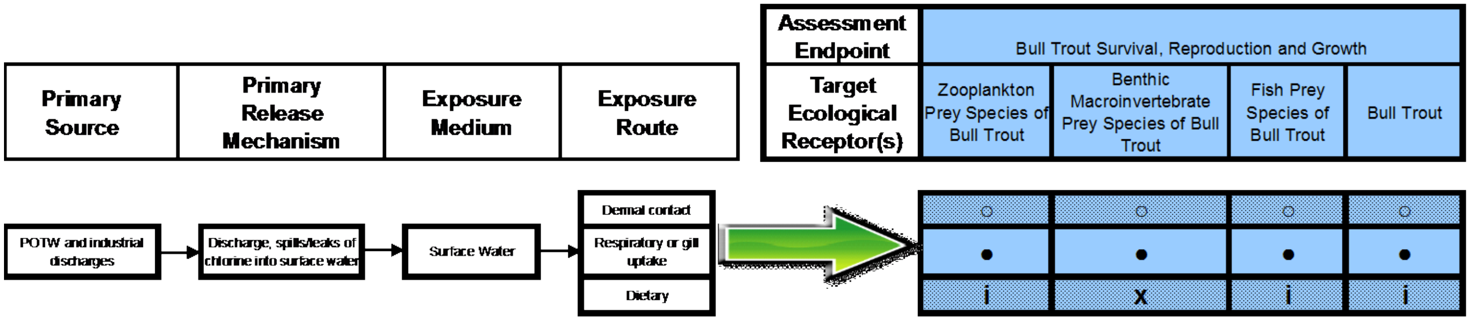
A conceptual model is a written description and visual representation of known or predicted relationships between ecological entities and the stressors to which they may be exposed. Conceptual models describe key relationships between contaminants and the BE assessment endpoint, the explicit expression of environmental values to be protected. By describing links and relationships between contaminant sources and the exposure pathways by which bull trout and their prey are exposed to contaminants, the conceptual model provides a framework for predicting the effects of the stressors (chemical contaminants) evaluated in this BE.

Figure 5.1 provides a summary of how bull trout and their prey species can potentially be exposed to chlorine. Transport mechanisms and exposure pathways are not considered in the derivation of aquatic life criteria, which instead focus on stressor effects on survival, growth and reproduction of aquatic organisms. However, the pathways, receptors, and attribute changes depicted in Figure 5.1 may be helpful for states and tribes as they adopt criteria into standards and need to evaluate potential exposure pathways affecting designated uses.

The conceptual model for chlorine is simple compared to conceptual models for other chemicals, for several reasons. The reactivity of chlorine with other substances found in aquatic systems, combined with the volatility of chlorine gas limits both the concentration and residence time of chlorine in aquatic systems. Unlike most other chemicals discharged to aquatic systems, sediments do not serve as a sink for chlorine. Sediment is therefore not a medium by which aquatic species are exposed to chlorine. The combination of these factors serves to minimize the potential exposure of aquatic species to chlorine discharged to surface waters. The mechanism of toxic action of chlorine described earlier in this section further limits the exposure of aquatic species to chlorine, as it precludes exposure via the dietary ingestion exposure route. Ingestion via drinking water is an insignificant contaminant exposure pathway to freshwater fish, which are physiologically constrained from ingesting water because of their need to maintain a higher internal solute content than found in their external freshwater environment.

The conceptual model for chlorine (Figure 5.1) illustrates that the toxicity assessment should focus on surface water concentrations of chlorine that affect the respiratory surfaces of aquatic species. Dietary ingestion of and dermal contact with chlorine are insignificant exposure routes for both bull trout and their prey.

Figure 5.1. Conceptual model for chlorine toxicity assessment



Legend

● = Complete and significant pathway
○ = Complete and significance unknown
i = Complete and insignificant pathway
x = Incomplete pathway

Shading indicates a pathway that will not be quantitatively evaluated in the BE.

Definitions

A **Complete** pathway means there is a potential for a contaminant to reach a receptor via the proposed exposure route.
An **Incomplete** pathway means there is no potential for a contaminant to reach a receptor via the proposed exposure route.
A **Significant** pathway means there is a high potential that the receptor will receive a significant proportion of its contaminant dose via the proposed route.
An **Insignificant** pathway means there is a low potential that the receptor will receive a significant proportion of its contaminant dose via the proposed route.
Significance Unknown means that it is unknown if the receptor will receive a significant proportion of its contaminant dose via the proposed route alone. However, the receptor could receive a significant proportion of its contaminant dose when combined with other pathways or other contaminants.

5.3.6.2.6 Risk Hypotheses

Risk hypotheses are assumptions regarding what responses assessment endpoints will show when they are exposed to stressors, and how the exposure of ecological entities to stressors will occur. Within this chlorine toxicity assessment, two risk hypotheses are under evaluation:

1) Short-term survival of bull trout will be adversely affected if they are exposed to chlorine concentrations in surface water at the acute criterion concentration of 19 µg/L.
2) Long-term survival, reproduction and/or growth of bull trout will be adversely affected if they are exposed to chlorine concentrations in surface water at the chronic criterion concentration of 11 µg/L.

Note that risk hypotheses are not the same as and do not take the form of a null hypothesis used in statistical hypothesis testing.

5.3.6.2.7 Analysis Plan

The analysis plan evaluates risk hypotheses to determine how they will be assessed using available and new information. The analysis plan includes a description of the toxicity assessment design, data needs, measures, and methods for conducting the analysis phase of the risk assessment.

This chlorine toxicity assessment is based completely on existing information. The toxicity data for aquatic species is that presented in the EPA (1985) water quality criteria document for chlorine, augmented by 2012 and 2013 EPA literature searches for additional toxicity information published subsequent to the EPA (1985) data set. The toxicity assessment infers or extrapolates chlorine effects on bull trout and their prey from this existing data.

5.3.6.2.8 Description of How Risks are to be Characterized

The basic approach for evaluating the protectiveness of water quality criteria to ESA-listed species used in the Oregon Toxics BE (EPA 2008) was to calculate an assessment effects concentration (EC_A) for each ESA-listed species. An EC_A value for a given ESA-listed species is the chemical concentration that represents a maximum level of effect considered acceptable. Within this toxicity assessment, the EC_A represents a chemical concentration in water, which could be an LC_{50}, EC_{50}, LC_{LOW}, EC_{LOW}, NOEC or LOEC, depending on context within the toxicity assessment. The EC_A for each listed species was then compared to the assessment exposure concentration (C_A), defined as either the acute or chronic water quality criterion for aquatic species. The comparison is in the form of a risk ratio (R) as shown in Equation 5.1:

Equation 5.1:

$$R = \frac{C_A}{EC_A}$$

Where:
R = risk ratio

C_A = assessment exposure concentration, equal to either the acute or chronic water quality criterion
EC_A = assessment effects concentration, equal to an LC_{50}, EC_{50}, LC_{LOW}, EC_{LOW}, NOEC or LOEC from a laboratory toxicity test with an aquatic species

If $C_A < EC_A$ (i.e. $R < 1$), the water quality criterion is expected to be lower than the chemical concentration expected to elicit toxicity in an ESA-listed species. In this case, a determination of "not likely to adversely affect (NLAA)" is made.

If $C_A \geq EC_A$ (i.e. $R \geq 1$), the water quality criterion is expected to be equal to or higher than the lowest chemical concentration expected to elicit toxicity in an ESA-listed species. In this case, exposure to chlorine at the criterion concentration is likely to adversely affect (LAA) bull trout.

Readers of this BE familiar with hazard assessment or ecological risk assessment procedures will recognize the risk ratio in Equation 5.1 as a safety factor, the inverse of a hazard quotient. As an example, if R = 0.1, the water quality criterion is 0.1 of the concentration needed to elicit toxic effects (or 10 times lower than the concentration needed to elicit toxic effects).

5.3.6.2.9 Description of How Risks are to be Characterized – Acute and Chronic Criteria

This section describes how empirical toxicity data will be processed for use in the analysis and risk characterization phases of this toxicity assessment. If empirically measured acute and/or chronic toxicity data are available for the ESA-listed species under evaluation, those concentrations are directly compared with the acute or chronic criterion, after undergoing the transformations described below, if needed. This procedure is also to evaluate toxicity data for a surrogate species; i.e., a closely related species that is assumed to have a similar toxic response as the ESA-listed species.

Using an LC_{50} as a toxic effect threshold during the toxicity assessment of the acute criterion clearly would not be protective of threatened and endangered species. By definition the LC_{50} represents the concentration lethal to 50% of test organisms under the conditions of the toxicity test. To convert an LC_{50} value to a toxic effects threshold, the lower 95% confidence interval (if available) of the LC_{50} from a single study is divided by 2.27. If multiple LC_{50} values are available for a species, the geometric mean LC_{50} is calculated, then divided by 2.27. These procedures were used by USEPA for the Oregon toxics criteria consultation (EPA 2008). The value of 2.27 serves to convert the LC_{50} concentration to an "LC_{LOW}" value that would result in little or no toxicity. The LC_{LOW} is the concentration posing between 0 - 10% mortality among test species, equivalent to the range of control mortality allowable in standard EPA and ASTM acute toxicity testing methods for fish species.

The basis for the 2.27 adjustment factor used to convert LC_{50} values to LC_{LOW} values is an analysis of data from 219 acute toxicity tests showing that the mean concentration lethal to 0 - 10% of the test population was 0.44 times the LC_{50} or its inverse, the LC_{50} divided by 2.27. The data and analysis on which the 2.27 value is based is described in the Federal Register on May 18, 1978 (43 FR 21506-21518). Briefly, the analysis consisted of calculating the geometric mean of the ratios of the highest concentration (HC) affecting or killing 0-10% of organisms divided by the LC_{50} or EC_{50} for the same organisms in the same acute test (i.e. the geometric mean of 219 HC/LC_{50} ratios from toxicity tests with a variety of chemicals).

Independent validation of the 2.27 adjustment factor was obtained from a study by Dwyer et al. (2005). Their work with five chemicals and 17 species, including some ESA-listed species, shows the average multiplier to calculate a no- or low-effect concentration from an LC_{50} varies among pollutants and species from 0.50 to 0.66, with a geometric mean factor for all species of 0.56. Use of the Dwyer et al. (2005) geometric mean LC_{50} multiplier is mathematically equivalent to dividing the LC_{50} by 1.8 (the inverse of 0.56 to two significant figures). All computations of the mean LC_{50}/LC_{10} presented in Dwyer et al. (2005) result in low- or no-acute effect concentrations (EC_A) higher than are calculated through the use of EPA's 2.27 adjustment factor. In other words, use of the Dwyer et al. (2005) multiplier of 0.56 results in a less conservative estimate of the low- or no-acute effect concentration (Dwyer et al. 2005 terminology) than does use of the EPA 2.27 adjustment factor used to calculate LC_{LOW} concentrations (EPA terminology) used in this BE. This observation suggests that the EPA-developed adjustment factor of 2.27 is a protective value that can be used to convert LC_{50} concentrations to LC_{LOW} concentrations. The LC_{LOW} concentration becomes the acute EC_A concentration, which is divided into the acute criterion to calculate the risk ratio.

If empirical chronic toxicity data are already reported in the literature for the listed species, the NOEC from the study is directly compared to the chronic criterion. If only empirical acute toxicity data are available for the listed species, the above procedures to convert LC_{50} to LC_{LOW} values are used. Once the LC_{LOW} concentration is obtained, it is divided by the chemical specific acute-chronic ratio (ACR) to yield the chronic EC_A concentration for the listed species. The chronic EC_A is then divided into the chronic criterion, yielding the risk ratio for the listed species.

If empirical toxicity data are unavailable for an ESA-listed species of interest, the measures of effect portion of the analysis phase (Section 5.3.6.4) describes how toxicity data for surrogate species is used to characterize risks to the ESA-listed species of concern.

5.3.6.2.10 Description of How Risks are to be Characterized – Toxicity to Prey of ESA-Listed Species

The range of acute and chronic EC_A values for the following broad groups of prey species are summarized in tabular form in the text: fish and aquatic invertebrates. Other taxa, such as amphibians, algae and aquatic macrophytes are not prey of bull trout. The aquatic invertebrate section is further subdivided to present the range of acute and chronic EC_A values for zooplankton, aquatic insects, non-zooplankton crustaceans and molluscs. Acute and chronic EC_A values for prey species are calculated in the same manner as are EC_A values for ESA-listed species or their surrogate species.

In the analysis on the effects of the water quality criteria on prey species, the acute and chronic EC_A range of values for prey species are compared to the acute and chronic criteria, respectively. No quantitative determinations are made regarding whether or not reductions in prey species richness are likely to adversely affect ESA-listed species.

The analysis of a meaningful reduction in the diet of ESA-listed species includes a qualitative discussion of which prey species have acute or chronic toxicity values below the criteria concentration, a discussion of whether those prey species are primary prey species of ESA-listed species, and whether or not the loss of those prey species is likely to adversely affect the listed species.

5.3.6.3 Environmental Fate of Chlorine

Chlorine is a chemical element, atomic number 17, atomic weight 35.453. Except for minute amounts released to the atmosphere from volcanic eruptions, elemental chlorine is not found in a free state in nature due to its reactive nature. Elemental chlorine is a yellowish green gas under all conditions normally found in the environment except for extreme cold temperatures (boiling point = -34°C or -29°F). Elemental chlorine is most commonly produced by the chloralkali process, which is the electrolysis of sodium chloride dissolved in water. Electrolysis of brine produces diatomic or elemental chlorine (Cl_2), hydrogen gas and sodium hydroxide.

The largest sources of chlorine to the Reservation TAS Waters are likely wastewater treatment plant discharges to which chlorine is added as a disinfectant, as discussed in Section 5.3.4. Use of chlorine since the early 1900's as a disinfectant in both drinking water and sewage before it is discharged to surface water, with the concomitant reduction or elimination of many waterborne infectious diseases has been identified as one of the top ten advances in public health in the last 100 years.

The water chemistry of chlorine in freshwater is among the most complex of any contaminant addressed in this BE. In addition to having a complex chemistry, there are multiple names in the literature for the same or similar combinations of chlorine chemical forms, necessitating this discussion of chlorine chemistry and terminology used in this BE.

The EPA aquatic life criteria for chlorine describes the toxicity of total residual chlorine (TRC), which is the combined concentration of different chemical forms of chlorine able to react with other substances, or which can interconvert among each other. Within the literature, TRC is generally synonymous with reactive chlorine (RC), combined residual chlorine (CRC), and total available chlorine (TAC).

Total residual chlorine includes free available chlorine (FAC; hypochlorous acid [HOCl] and the hypochlorite ion [OCl^-]; also referred to as free residual chlorine [FRC]) and combined available chlorine (CAC; organic and inorganic chloramines [NH_2Cl or monochloramine, $NHCl_2$ or dichloramine, and NCl_3 or nitrogen trichloride]). Chloramines are also often termed N-chloramides.

In ambient freshwater, the dominant reactive chlorine species are hypochlorous acid and its associated hypochlorite anion in waters with low ammonia or nitrogen concentrations. The hypochlorite anion is one of several compounds or anions that collectively are called chlorine oxides, the best known of which may be the perchlorate anion ($HClO_4^-$). Hypochlorous acid and its associated hypochlorite anion, along with chlorine dioxide (ClO_2) are by far the chlorine oxides most commonly utilized in water disinfection. Chlorine dioxide is also commonly used in the industrial bleaching of wood pulp.

Like elemental chlorine, chlorine dioxide is also a gas at temperatures found in the environment. Rather than hydrolyzing in water as chlorine does, chlorine dioxide forms a true solution in water under typical surface water conditions. Chlorine dioxide is volatile and is easily lost from water. Chlorine dioxide is a powerful oxidant but unlike chlorine, does not readily combine with ammonia to form chloramines. Chlorine dioxide also does not form trihalomethanes. Due to its reactive nature, chlorine dioxide is produced on-site at locations where it is used as a disinfectant.

Monochloramine can be a dominant chemical form if sufficient nitrogen, particularly in the form of ammonia/ammonium ion is present in surface water. Di- and trichloramines are only formed in water at pH < 6 and when the Cl_2:NH_3 is at least 5:1 (Hankin 2001). Free chlorine gas (Cl_2) becomes the dominant chemical form only in low organic content waters with a pH < 2. Chlorine can also react with naturally occurring organic matter in water to form a number of disinfection byproducts, including trihalomethane compounds such as chloroform.

The initial chemical reaction when Cl_2 is added to surface water is one of hydrolysis (EPA 1976):

$$Cl_2 + H_2O \rightarrow HOCl + H^+ + Cl^-$$

Hypochlorous acid (HOCl) is a weak acid, and undergoes a pH dependent dissociation:

$$HOCl \leftrightarrow H^+ + OCl^-$$

The release of hydrogen ions from hydrolysis of Cl_2 and the dissociation of hypochlorous acid are the reasons chlorination of surface water tends to reduce the pH of the water. The ratio of HOCl to OCl^- is pH dependent, with 96% HOCl present at pH 6, 75% HOCl at pH 7, 22% HOCl at pH 8, and only 3% HOCl at pH 9. The proportion of HOCl present in water is significant, as HOCl is the chemical form most effective as a disinfectant (Shannon et al. 2008).

Analytical determination of the various chemical species within TRC is generally not performed, and is generally not feasible at the low µg/L concentrations of toxicological relevance in surface waters. This is the reason the Coeur d'Alene WQS for chlorine, as well as the EPA aquatic life criteria on which they are based are expressed in terms of TRC, not as criteria for the individual chemical forms comprising TRC.

Without continuous addition of chlorine to water, TRC concentrations in water can be quickly reduced through several chemical, physical and biological processes. In addition to the chemical reactions in the water column described above, these processes include volatilization, photodegradation, adsorption on solids, and reactions with organic matter and aquatic life.

Degradation rates of chlorine species in natural waters are generally rapid, ranging between seconds and hours. The half life of chlorine gas (Cl_2) in surface water has been reported as 0.005 second (EPA 1994). Cooper et al. (2007) have performed a number of photodegradation half life studies with HOCl / OCl^- mixtures under various pH values and water depths, and at several dissolved organic matter concentrations. The light intensity used was based on that at solar noon in both summer and winter at the latitude of Miami, Florida (24° N). In distilled water, the photodegradation half life of a HOCl / OCl^- mixture ranged between 41 minutes at pH 5.0 to 17 minutes at pH 7.0 to six minutes at pH 12.0. Half lives of a HOCl / OCl^- mixture were shortest in waters exposed to higher light intensity (i.e. summer light intensities), in waters with the lowest dissolved organic matter concentrations, and in waters of the shallowest depths. Shortest half lives of just over nine minutes occurred under conditions of summer light intensity in surface water at 0 meters depth and with dissolved organic matter concentrations of either 0.53 or 17.6 mg C/L. The only half lives longer than 10 hours observed by Cooper et al. (2007) occurred under conditions of water with a depth $\geq$ 1 meter with a dissolved organic matter concentration of 17.6 mg C/L under either summer or winter light intensity. In water containing 0.53 mg C/L dissolved organic matter and with depth $\leq$ 5 meters, all HOCl / OCl^- mixture half lives were 5.85 hours or shorter under all light intensities tested.

The short persistence of chlorine in water relative to the duration of standard toxicity tests with fish and invertebrates has direct bearing on the experimental design of toxicity studies useable to evaluate chlorine toxicity to bull trout. In order to maintain a consistent concentration of chlorine in laboratory toxicity tests, flow through studies where chlorine concentrations are constantly replenished are needed. EPA's water quality criteria are designed to apply in situations of continuous exposure to a contaminant. They are not designed to be applied in situations of intermittent contaminant exposure. Much of the available aquatic toxicity data for chlorine describes information generated during either very short term studies (three hours or shorter) or from intermittent exposures. These short term and intermittent studies are not suited for EPA water quality criteria development or evaluation of effects on threatened or endangered species, as they are not representative of effects from continuous exposure to chlorine. The chlorine effects determination for bull trout within this BE are therefore based only on continuous flow through exposures of acceptable duration (96 hours for acute mortality studies with fish).

5.3.6.4 Analysis

Analysis is the phase of the ecological risk assessment process that examines the two primary components of risk, exposure and effects, and evaluates the relationships between these components and with the characteristics of the ecosystem and receptor(s) under evaluation. The objective of the analysis phase is to provide the information necessary for the risk characterization phase to determine or predict ecological responses of valued ecological entities to stressors under the exposure conditions of interest.

The following tasks are performed during the analysis phase:

- Select the information to be used in evaluating the risk hypotheses

- Analyze exposure by examining the sources of stressors, the distribution of stressors in the environment, and the extent of co-occurrence or contact between stressors and the ecological entities to be protected
- Analyze effects by examining stressor-response relationships, evidence of causality, and the relationship between measures of effect and the assessment endpoints
- Identify one or more lines of evidence to be used to characterize risk
- Summarize the conclusions about exposure and ecological effects.

Three types of measures are identified during the analysis phase:

1. Measures of exposure
2. Measures of ecosystem and receptor characteristics
3. Measures of effect.

The measures identified for use in this chlorine toxicity assessment are described in the next sections, followed by a description of the lines of evidence evaluated during the risk characterization phase.

5.3.6.4.1 Measures of Exposure

Section 5.3.4 describes the sources of chlorine within the action area. Given the short residence time of chlorine in surface waters, discussed in Section 5.3.6.3, it is likely to be present in only small areas near or immediately downstream of the outfall of the permitted discharger of chlorine. Exposure of bull trout to chlorine is expected to be minimal, although it appears as though measured chlorine concentrations in surface waters within the action area are unavailable.

5.3.6.4.2 Measures of Ecosystem and Receptor Characteristics

Surface waters within the action area are described in Section 2.2. They consist of portions of Coeur d'Alene Lake and St. Joe River, illustrated in Figure 2.1.

Section 3.3 and its subsections describe the range, critical habitat, life history, population trends and status of bull trout, the only ESA-listed species that is evaluated in this toxicity assessment. A summary of the germane bull trout distribution and life history attributes for this toxicity assessment are given in the next paragraphs.

The predominant life stages of bull trout found in the action areas are adfluvial subadults and adults that use the lake waters and St. Joe River to forage, migrate, mature, or overwinter. Action area waters are not believed to not support bull trout spawning or juvenile rearing (USFWS 2010). However, bull trout are present in action area waters throughout the year. Prey species of bull trout, as described in the Oregon Toxics BE (EPA 2008) differ depending on the life stage. Small bull trout eat terrestrial and aquatic insects but shift to preying on other fish as they grow larger. Large bull trout are primarily fish predators. Bull trout evolved with whitefish, sculpins, and other trout and use all of them as food sources. The November 1, 1999 listing in the Federal Register on Determination of Threatened Status for Bull Trout in the Coterminous United States (FR 64:58910-58933) states that juvenile bull trout prey on terrestrial and aquatic insects, macrozooplankton, amphipods, mysids, crayfish, and small fish. The most detailed studies on juvenile and subadult food habits of bull trout appear to have been performed in the Flathead River basin of Montana (Nakano et al. 1992, Fraley and Shepard 1989). Both studies found that juvenile bull trout in streams preyed primarily on Diptera and Ephemeroptera in proportion to their abundance in the streams. The switch from invertebrate to fish prey begins when bull trout are approximately 110 mm in length (Fraley and Shepard 1989). More taxonomically detailed food habits information in Nakano et al. (1992) indicated that mayflies of the family Baetidae and insects of the family Chironomidae accounted for roughly 75% of the diet of bull trout less than 154 mm in fork length. Mayflies from other families (Heptageniidae and Ephemerellidae), stoneflies (Plecoptera), caddisflies (Trichoptera), blackflies (Simuliidae) and occasional terrestrial insects caught up in stream invertebrate drift accounted for the remainder of the juvenile bull trout diet.

A primary basis for using toxicity data from other salmonid species as surrogates for bull trout sensitivity to contaminants is their close taxonomic relationship to other salmonids, particularly to other species of the genus *Salvelinus*. Until 1980, bull trout (*Salvelinus confluentus*) and Dolly Varden (*Salvelinus malma*) were considered by the American Fisheries Society to be the same species (Robins et al. 1980). Bull trout are known to hybridize with both brook trout (*Salvelinus fontinalis*) and lake trout (*Salvelinus namaycush*) (USFWS 1998), as well as with Dolly Varden.

5.3.6.4.3 Measures of Effect

To characterize ecological effects, it must first be verified that the stressor elicits adverse effects on ecological entities of interest. Once verified, the adverse effects are described, and then evaluated to determine how the magnitude of adverse effect changes as the concentration of the stressor changes. Finally, it is confirmed that the observed effects are consistent with the environmental values to be protected as described in the assessment endpoints, as well as confirming that the exposure conditions under which the observed adverse effects occur are consistent with the conceptual model.

All measures of effect in this toxicity assessment are laboratory toxicity tests where empirically measured chlorine concentrations in water were associated with adverse effects on survival, reproduction or growth of aquatic species. Mixture studies where chlorine was part of a mixture of contaminants to which a test species was exposed are not included in the measures of effect data, as it is generally not possible to attribute the proportion of the response due to chlorine.

The three sources of measures of effect are the acute and chronic toxicity data for aquatic species in the EPA (1985) Ambient Water Quality Criteria for Chlorine, specifically Tables 2 (empirical chronic toxicity) and 3 (empirical rank ordered genus and species mean acute toxicity data) from the chlorine criteria document, the additional toxicity data identified by EPA during its 2012 literature review on chlorine toxicity, and a supplemental EPA 2013 literature review that searched specifically for toxicity information on chloramines and other chlorine chemical forms not searched for during the EPA 2012 literature review. The 2013 EPA literature review in ECOTOX searched for all freshwater animal toxicity data for the following chlorine chemical forms listed in Table 5.3.

Table 5.3. Chemicals for which Aquatic Toxicity Data Searches were Performed in ECOTOX

Chemical	Chemical Abstracts Service ID
Chlorine (same CAS ID as TRC)	7782-50-5
Chlorine dioxide	10049-00-4
Monochloramine	10599-90-3
Dichloramine	3400-09-7
Trichloramine (nitrogen trichloride)	10025-85-1
Hypochlorous acid	7790-92-3
Hypochlorite anion	14380-61-1

Chlorine dioxide is reported as chlorine oxide in the ECOTOX output. No additional chronic toxicity data meeting current EPA data quality criteria requirements were found in addition to those already identified in Table 2 of the EPA (1985) chlorine water quality criteria document.

There are multiple ways in which empirical toxicity data can be processed and evaluated to evaluate toxicity to aquatic species. The conversion of LC_{50} data to LC_{LOW} data by dividing the LC_{50} by an adjustment factor of 2.27 has been presented in Section 5.3.6.2.9. Comparison of LC_{LOW} values to the acute chlorine criterion is one possible line of evidence that could be used in risk characterization. Based on the available measures of exposure, measures of ecosystem and receptor characteristics, and measures of effect, the specific lines of evidence to be evaluated in risk characterization are presented in the next section.

5.3.6.4.4 Lines of Evidence

Information derived from different sources or by different techniques that can be used to describe and interpret risk estimates are called lines of evidence in ecological risk assessments. Sometimes more than one line of evidence is needed to reasonably demonstrate that stressors are likely to cause adverse effects on the assessment endpoint. This situation arises when either the amount of information available for a line of evidence is limited, or if substantial uncertainties exist regarding the information to be used in risk characterization. If multiple lines of evidence are evaluated and some lines of evidence conflict with others, professional judgment is needed to determine which data should be considered more reliable or relevant to the questions.

Once there is agreement on which lines of evidence are required to answer questions concerning the assessment endpoint, the measures of effect by which the risk hypotheses will be examined can be selected.

Interspecies Correlation Estimation (ICE) Methodology

It is impractical for toxicologists to perform laboratory toxicity studies on all aquatic species present in North America with all chemicals to which they are exposed in the environment. This is particularly true for ESA-listed species, whose rarity or limited distribution in the environment generally precludes their use as test organisms in aquatic toxicology, except for limited research purposes. ICE models are statistical regressions that permit estimations of LC_{50}s to be made for a species or higher taxa (genus, family) having no measured acute toxicity information from a species for which five or more LC_{50}s have been measured. The detailed description of how ICE models were developed and their use to estimate LC_{50}s for taxa for which no toxicity information is available is given in Raimondo et al. (2013).

ICE models between two taxa are linear regressions of the form shown in Equation 5.2:

Equation 5.2: $\log_{10} X_2 = a + (b \times [\log_{10} X_1])$

Where: X_1 is a measured LC_{50} value for an aquatic species (e.g. coho salmon, Daphnia magna)
X_2 is the predicted LC_{50} value for the taxa (species, genus or family) without toxicity data

The current version of ICE, called WebICE, is freely available from EPA on the Internet at: http://www.epa.gov/ceampubl/fchain/webice/

The endangered species module of WebICE contains regressions between bull trout and brook trout, both of which are members of the genus *Salvelinus*. This regression was used to estimate bull trout LC_{50} values from the empirically available brook trout LC_{50} data that is of acceptable quality to EPA for use in the present day derivation of water quality criteria. The lower 95% confidence interval of the surrogate species empirically measured LC_{50} is calculated by the ICE model. The ICE-calculated lower 95% confidence interval is then divided by 2.27 to obtain an LC_{LOW} value. This LC_{LOW} value is the EC_A value used with the acute chlorine criterion to calculate a risk ratio.

Assumed Toxicant Sensitivity Equivalence

This line of evidence takes advantage of the taxonomic similarity between brook trout and bull trout, which are known to hybridize and produce fertile hybrids (Kanda et al. 2002). The bull trout LC_{50} value is assumed to be equivalent to the empirically determined brook trout LC_{50}. The LC_{50} is divided by 2.27 to obtain the EC_A concentration, which is then divided into the acute chlorine criterion concentration to calculate the risk ratio.

Assumed toxicant sensitivity similarity between all members of the family Salmonidae

Although less closely related to bull trout than are brook trout, the toxicity data for other members of the family Salmonidae presented in the EPA (1985) chlorine criteria document are sufficiently taxonomically related to bull trout that their LC_{50} values could be used with existing ICE models to calculate acute and chronic bull trout EC_A values. This approach permits four species in addition to brook trout to be used to evaluate chlorine toxicity to bull trout. The more lines of evidence that point to the same conclusion regarding the protectiveness of the chlorine criteria, the more reliable that conclusion becomes.

The lines of evidence identified in the analysis phase will be used with the empirical toxicity data summarized in the measures of effect section to determine the protectiveness of the Tribe's chlorine criteria in the risk characterization phase of this toxicity assessment.

Chronic toxicity line of evidence

To evaluate the chronic chlorine criterion, the 95% lower confidence interval of the acute EC_A generated from an ICE model is divided by the acute-chronic ratio (ACR) for chlorine. Specifically, the bull trout estimate of the 96-hr LC_{50} and its 95% lower confidence interval derived from the ICE model using the empirical brook trout geometric mean LC_{50} data from Thatcher et al. (1976) was divided by the chlorine specific ACR from the EPA (1985) chlorine criteria document. The geometric mean freshwater chlorine ACR was calculated to be 3.345.

5.3.6.5 Risk Characterization

Risk characterization is the final phase of ecological risk assessment. It combines and integrates the products of the problem formulation and analysis phases to estimate and describe any identified adverse ecological effects related to the assessment endpoints. The relationships between stressors, effects, and ecological entities are used to reach conclusions regarding the occurrence of exposure and the adversity of existing or anticipated effects.

After estimating the risk, risk estimates are described in the context of the significance of any adverse effects and lines of evidence supporting their likelihood. Finally, the uncertainties of the risk assessment are described, followed by the conclusions and determinations of the risk characterization.

The approaches used in this risk characterization to assess chlorine toxicity to bull trout and their prey are summarized in Table 5.4.

Table 5.4. Summary of Assessment Endpoints, Measures of Effect and Lines of Evidence Used in Toxicity Assessment of Chlorine

Assessment Endpoint	Measures of Effect	Lines of Evidence
Survival, reproduction and growth of bull trout	For acute effects: LC_{50} or EC_{50}, calculated acute EC_A	Interspecies Correlation Estimation (ICE) model at genus *Salvelinus* level
		Assumed toxicant sensitivity equivalence of all members of genus *Salvelinus*
		Assumed toxicant sensitivity similarity between all members of the family *Salmonidae*
	For chronic effects: EC_{20}, NOEC and LOEC, calculated MATC, calculated chronic EC_A	Division of acute EC_A values by acute-chronic ratio to calculate a no effect chronic EC_A
	For effects on prey species: LC_{50}, EC_{50}, EC_{20}, NOEC, LOEC, calculated MATC, calculated acute and chronic EC_A	Comparison of acute and chronic EC_A for prey species to acute and chronic water quality criteria
	For multiple routes of exposure:	Not evaluated, bioaccumulated dose of chlorine not required to elicit toxicity, dietary ingestion is an incomplete or insignificant exposure pathway for aquatic species

5.3.6.5.1 Acute Chlorine Criterion

No empirical data are available that describe the acute response of bull trout to chlorine.

The EPA (1985) chlorine criteria document and the 2012 and 2013 ECOTOX searches completed by EPA all identified the study of Thatcher et al. (1976), which reported the effects of temperature changes on chlorine toxicity to juvenile brook trout (*Salvelinus fontinalis*). Brook trout are the same genus as are bull trout (*Salvelinus confluentus*), and thus are expected to have similar sensitivity to contaminants as do bull trout. Brook trout is used as a surrogate species for bull trout in two of the three lines of evidence used to evaluation the protectiveness of the acute chlorine criterion to bull trout.

Within the Thatcher et al. (1976) study, six 96-hr LC_{50} studies performed at either 10°C or 15°C provide suitably high quality data that can be used to evaluate TRC toxicity to brook trout. LC_{50} values for the four tests run at 10°C and the two tests run at 15°C ranged between 131 – 179 µg/L. Temperature had no statistically distinguishable effect on the six LC_{50} values, so they were pooled to calculate a geometric mean 96-hr LC_{50} of 153 µg/L.

Interspecies Correlation Estimation Line of Evidence

Under the hierarchical lines of evidence approach used in the Oregon Toxics BE (EPA 2008), the two highest tiers in the six-tiered hierarchy were 1) use of species specific toxicity data, and 2) an ICE model is available for the listed species. The endangered species module of WebICE permits bull trout effect concentrations to be estimated from both empirical brook trout and lake trout data, two species in the genus *Salvelinus* known to hybridize with bull trout.

Entering the geometric mean 153 µg/L 96-hr LC_{50} for brook trout into WebICE yielded a predicted bull trout LC_{50} of 125 µg/L, with a 95% lower confidence interval of 49 µg/L. When divided by 2.27, the 95% lower confidence interval of 49 µg/L yielded an EC_A concentration of 22 µg/L. The assessment exposure concentration (C_A, which equals the acute criterion of 19 µg/L) divided by the assessment effects concentration (EC_A) results in a risk ratio of 0.86. A risk ratio less than one indicates that adverse effects are not expected if bull trout are exposed to the acute criterion of 19 µg/L.

Using the single lake trout empirical LC_{50} of 60 µg/L in WebICE yielded a predicted bull trout LC_{50} of 66 µg/L, with a 95% lower confidence interval of 46 µg/L. When divided by 2.27, the 46 µg/L 95% lower confidence interval results in an EC_A concentration of 20 µg/L. The C_A (assessment exposure concentration = the acute criterion of 19 µg/L) divided by the EC_A (assessment effects concentration) yields a risk ratio of 0.95. Risk ratios less than one indicate that adverse effects are not expected from bull trout exposure to the acute criterion of 19 µg/L.

The interspecies correlation estimation line of evidence, evaluated with two *Salvelinus* species closely related taxonomically to bull trout, and both of which are known to hybridize with bull trout, both indicated that the Coeur d'Alene Tribe's acute chlorine criterion is protective of bull trout.

Assumed Toxicant Sensitivity Equivalence Line of Evidence

Dividing the 153 µg/L geometric mean chlorine LC_{50} value derived from the Thatcher et al. (1976) data for brook trout by 2.27 yields an acute toxicity threshold (LC_{LOW}) of 67.0 µg/L for brook trout. If it is assumed that brook trout and bull trout are equally sensitive to chlorine, the LC_{LOW} value for acute chlorine toxicity to bull trout would also be 67 µg/L. Because this LC_{LOW} value is set to the EC_A concentration and is significantly greater than the acute criterion of 19 µg/L, this line of evidence also indicates that the Tribe's acute chlorine criterion is protective of bull trout.

Assumed Toxicant Sensitivity Similarity between Family Salmonidae Line of Evidence

In addition to the two *Salvelinus* species to species ICE models evaluated earlier (i.e. the brook trout – bull trout and lake trout – bull trout ICE models), empirical LC_{50} data for three species in the same family (Salmonidae) as bull trout also have ICE models available that could be used in an effort to provide additional support for the conclusions of the brook trout ICE and the assumed toxicant sensitivity equivalence lines of evidence. Table 5.5 presents the results of bull trout EC_A estimates derived from ICE models with rainbow trout, cutthroat trout and coho salmon. For comparative purposes, Table 5.5 also contains the ICE model output for brook trout and lake trout used earlier in this section.

Of the five Salmonidae species evaluated using ICE models, only the coho salmon model-predicted EC_A of 14 µg/L is lower than the acute criterion of 19 µg/L. All five other lines of evidence within the risk characterization of the acute chlorine criterion indicate that the Tribe's acute chlorine criterion is protective of bull trout. Under the EPA (1998) risk assessment guidance procedures, the commonly used risk assessment term 'weight of evidence' is de-emphasized in favor of a more inclusive lines of evidence approach, which evaluates all available information, even evidence that may be qualitative in nature. In other risk characterizations, particularly those performed at Superfund sites under the EPA (1997) Superfund-specific guidance for performing ecological risk assessments, the weight of evidence approach is often quantitative, assigning weights or rankings to individual lines of evidence, an approach that results in some lines of evidence being more important than others during risk characterization and during subsequent management decisions based on the risk assessment.

Table 5.5. EC_A Estimates for Bull Trout Derived from ICE Models

		All concentrations are µg/L					
Surrogate Species Scientific Name	Surrogate Species Common Name	SMAV [a]	Estimated Bull Trout LC_{50} [b]	Estimated Bull Trout 95% LCL of LC_{50} [c]	Estimated Bull Trout Acute EC_A [d]	Number of Data Pairs	Percent Cross-Validation Success
Salvelinus fontinalis	Brook trout	153	125	49	22	18	88.9
Salvelinus namayacush	Lake trout	60	66	46	20	29	96.6
Oncorhynchus kisutch	Coho salmon	75	45	32	14	14	100.0
Oncorhynchus clarki	Cutthroat trout	85	108	72	32	26	92.3
Oncorhynchus mykiss	Rainbow trout	62	73	52	23	39	92.3

[a] SMAV = Species Mean Acute Value - geometric mean of all LC_{50} values of acceptable data quality.
[b] LC_{50} estimated by interspecies correlation estimation (ICE) using surrogate species SMAV as input
[c] 95% LCL = 95% lower confidence interval of LC_{50} estimated from ICE
[d] EC_A (assessment effects concentration) = ICE estimated 95% LCL of LC_{50} / 2.27
Shaded cells indicate predicted acute EC_A is lower than the acute chlorine criterion of 19 µg/L

The percent cross-validation success column in Table 5.5 is a statistical measure of uncertainty in the ICE models. Its interpretation is discussed more fully in the uncertainty analysis (Section 5.3.6.5.5).

Summary of Acute Chlorine Criterion Risk Characterization

A weight of evidence approach where some lines of evidence carry more weight or are considered more important than other was not used in this chlorine toxicity assessment. Because five lines of evidence indicate that the Coeur d'Alene Tribe's acute chlorine criterion is protective of bull trout, and only one line of evidence indicates it is not protective, EPA concludes that the Tribe's acute chlorine criterion is protective of bull trout.

5.3.6.5.2 Chronic Chlorine Criterion

No empirical data are available that describe the chronic response of bull trout to chlorine.

The EPA (1985) chlorine criteria document and the 2012 and 2013 ECOTOX searches completed by EPA in September 2012 and June 2013, respectively, all identified the study of Thatcher et al. (1976), which reported the effects of temperature changes on chlorine toxicity to juvenile brook trout (*Salvelinus fontinalis*). Brook trout are the same genus as are bull trout (*Salvelinus confluentus*), and thus are expected to have similar sensitivity to contaminants as do bull trout. Brook trout is used as a surrogate species for bull trout in chronic toxicity line of evidence used to evaluate the protectiveness of the chronic chlorine criterion to bull trout.

The brook trout geometric mean 96-hr LC_{50} of 153 µg/L calculated from data in Thatcher et al. (1976) study was used as the starting point for the chronic criterion evaluation. This brook trout LC50 was use in Web-ICE to determine an estimate of the bull trout LC_{50} and its 95% lower confidence interval. The predicted bull trout LC_{50} of 125 µg/L, with a 95% lower confidence interval of 49 µg/L, the same concentrations used to evaluate the acute criterion. But instead of dividing the 95% lower confidence interval by the 2.27 adjustment factor as was done during evaluation of the acute criterion, the lower 95% confidence interval of the ICE estimated LC_{50} was divided by the chlorine ACR of 3.345. This calculation resulted in a chronic EC_A concentration of 15 µg/L. (Note: All ICE models use measured acute LC_{50} data as the input to the model. Input of chronic NOEC values to the ICE model will result in different estimates of the chronic EC_A than will input of the LC_{50} and dividing the modeled estimate of the 95% lower confidence interval by the ACR). When divided into the assessment exposure concentration (C_A = the chronic criterion of 11 µg/L) to calculate the risk ratio, the resulting risk ratio of 0.73 indicates that the Tribe's chronic chlorine criterion is not likely to adversely affect bull trout.

5.3.6.5.3 Chlorine Effects on Prey Species

This section evaluates the potential for adverse effects on bull trout due to direct toxicity to their prey, followed by the loss of bull trout food items from the aquatic system. Results are presented in Table 5.6 for bull trout prey, and are expressed as a range of acute EC_A and chronic EC_A toxicity values for various categories of prey species.

Table 5.6. Toxicity of Chlorine to Food Items of Bull Trout

Assessment Exposure Concentrations (C_A): Acute = 19 µg/L, Chronic = 11 µg/L		
Organism Type	**Acute EC_A Range (µg/L)**	**Chronic EC_A Range (µg/L)**
Fish	20 – 313	13 - 212
Amphibians	No data	No data
All aquatic invertebrates	5.1 - 1410	3.5 - 957
Aquatic insects	5.1 - 1410	3.5 - 957
Crustaceans	5.9 – 297	4.0 – 201
Zooplankton	12 – 34	8.3 – 23
Molluscs	31 – 105	21 – 71

No fish species had acute or chronic EC_A values lower than the respective acute or chronic water quality criteria. This finding supports a conclusion that the Tribe's chlorine criteria should not have any adverse effect on prey of adult bull trout, which normally feed on fish.

As described in the Measures of Ecosystem and Receptor Characteristics section (Section 5.3.6.4.2), juvenile and subadult bull trout feed on a variety of invertebrate species before switching over to the primarily fish diet of adult bull trout. The favored prey appears to be mayflies and dipteran larvae. Table 5.6 indicates that both the lowest calculated acute and chronic EC_A values are lower than the respective acute and chronic chlorine criteria for aquatic insects, crustaceans and zooplankton. Among aquatic insects, data for two of the six available insect species, both of which are mayflies, yielded both acute and chronic EC_A values lower than the respective acute and chronic criteria. A third mayfly species had acute and chronic EC_A values higher than the acute and chronic criteria, as did a caddisfly and two beetle species. Of the remaining 12 invertebrate species with available data (three zooplankton species, three molluscs and six non-zooplankton crustaceans), only one zooplankton species (*Daphnia magna*, the single most sensitive species to chlorine) and one crustacean (*Gammarus minus*) had calculated acute and chronic EC_A concentrations lower than the respective acute and chronic water quality criteria.

Most aquatic species, including bull trout, tend to be opportunistic feeders. Numerous alternative prey species exist for bull trout with acute and chronic EC_A values above the chlorine criteria. This would minimize the potential for adverse effects on bull trout from chlorine toxicity to their prey. In addition, any areas with elevated chlorine concentrations are expected to be small because of the transient nature of chlorine, and bull trout will be able to move to adjacent areas with lower chlorine concentrations and greater food abundance. Therefore, EPA believes that the acute and chronic chlorine criteria will not result in a meaningful reduction in the available prey for bull trout.

5.3.6.5.4 Chlorine Multiple Routes of Exposure Assessment

As discussed in Section 5.3.6.2.3, chlorine is one of the relatively few chemicals that does not require an internally bioaccumulated dose to elicit toxicity to aquatic life. EPA's ECOTOX database contains no information on the bioaccumulation of chlorine, chlorine oxide or chloramines, indirectly supporting the premise that chlorine is an external toxin whose toxicity is elicited externally on the gill surfaces of fish, not an internal toxin. This implies that exposure to waterborne chlorine is the only exposure route of importance to bull trout. Dietary toxicity from chlorine residues in prey species, or from bioaccumulation of chlorine in bull trout tissues are not routes of exposure for chlorine.

5.3.6.5.5 Uncertainties Associated with the Chlorine Toxicity to Bull Trout Assessment

By design, risk assessments are conservative in the face of uncertainty. In this context, conservative means efforts were made to minimize the chances of underestimating exposure, effects, or risk. The uncertainty analysis portion of this chlorine toxicity assessment is intended to illustrate the degree of confidence in the conclusions of the assessment.

Uncertainty in a risk assessment has four components:

1. **Variation** (e.g. a fish is exposed to a range of chemical concentrations in water, not to a constant concentration of a chemical);
2. **Model uncertainty** (e.g. use of a single species or several target ecological receptors to represent the sensitivity of bull trout to chlorine introduces uncertainty because of the considerable amount of interspecies variability in sensitivity to a chemical);
3. **Decision rule uncertainty** (e.g. use of a dichotomous decision framework to determine chlorine effects (i.e. NLAA vs. LAA) instead of calculating the probability of an adverse effect at the criteria concentrations); and
4. **True unknowns** (e.g. the toxic effects of chlorine in water on bull trout survival, growth, and reproduction have never been studied, and are unknown).

Consistent with the methods of the problem formulation, receptor-contaminant pairs subject to potentially unacceptable risk from exposure to chlorine in surface waters were identified using conservative methods and assumptions. Examples of conservatism include assumptions that chlorine contaminant concentrations are 100% bioavailable, and assumptions that the most reliable evaluation of chlorine toxicity to bull trout in the absence of empirical bull trout data comes from basing the assessment only on the most closely taxonomically related species to bull trout that had available and high quality empirical toxicity data.

The largest single uncertainty in the chlorine toxicity assessment is the absence of any measured toxicity data for bull trout. This is a true unknown, and required the use of toxicity data for surrogate species to estimate chlorine effects on bull trout within this BE.

Much of the risk characterization is based on the output of ICE models. ICE models are generated from a database of empirical LC_{50} values for a large number of chemicals. To generate an ICE model, all species LC_{50}s are paired with each other by common chemical. Three or more common chemicals per pair are required to develop an ICE model. The more LC_{50} pairs that are available to develop an ICE model, the less uncertain are model predictions and the more statistical power model predictions have (statistical power is the probability that a hypothesis test will correctly reject a null hypothesis that is false). Among the salmonid ICE models run in this toxicity assessment to evaluate chlorine toxicity to bull trout, the rainbow trout (37) and lake trout (27) models had the most toxicity pairs available from which to generate ICE models. The coho salmon ICE model, the only ICE model to predict a bull trout acute EC_A lower than the acute criterion of 19 µg/L, had the fewest toxicity data pairs available to generate an ICE model.

Uncertainty in the ICE models is described by the percent cross-validation success statistic. According to Raimondo et al. (2013), the percent cross-validation success rate for each model is the proportion of data points that are predicted within 5-fold of the actual LC_{50} value. There is a strong relationship between taxonomic distance and cross-validation success rate, with uncertainty increasing with larger taxonomic distance. This is the primary reason that the first lines of evidence evaluated during the toxicity assessment of the acute criterion were ICE models for the two species taxonomically closest to bull trout (brook trout and lake trout). For fish and aquatic invertebrates, ICE models overall predict within 5-fold and 10-fold of the actual LC_{50} value with 91 and 96% certainty for surrogate and predicted taxa within the same family, and for 86 and 96% within the same order. All ICE models used in the chlorine toxicity assessment had cross-validation success rates greater than 86%, which would be the minimum acceptable cross validation percentage for any ICE model run between two species of the order Salmoniformes. Current fish taxonomy (Eschmeyer 1998) recognizes the family Salmonidae as the only family with currently living species within the order Salmoniformes.

EPA's aquatic life criteria are designed to protect 95% of aquatic genera from adverse effects, not 100% of aquatic species. Given this design, it is possible that one or more important prey species of bull trout within the action area that were not tested may be subject to toxic effects at chlorine concentrations lower than the acute or chronic criteria. Loss of such species could reduce the prey base available to subadult bull trout. Four of 18 invertebrate species (22%) for which empirical chlorine toxicity data are available were affected by TRC concentrations lower than the acute or chronic criteria.

Use of acute-chronic ratios to convert 96-hr LC_{50} data to chronic maximum acceptable toxicant concentrations (MATC's) introduces uncertainties into the evaluation of the chronic criteria, as the empirical data from which the geometric mean 3.345 ACR in EPA (1985) was derived differ for the three species ACR's used to calculate the geometric mean ACR. An ACR of 3.345 is low compared to the ACR of most other chemicals. A study by Raimondo et al. (2007) determined a geometric mean acute-chronic ratio of 8.3 from a data set of 456 same-species pairs of acute and maximum acceptable toxicant concentrations for metals, narcotics, pesticides, and other organic chemicals. The chlorine ACR of 3.345 may be indicative of a chemical with a relatively steep dose response curve, meaning the difference between adverse and no adverse effect concentrations for a given species may be small. Steep dose-response curves for chlorine have been empirically identified for fish species (Tsai et al. 1990).

5.3.6.6 Chlorine Effects Determinations and Summary

To evaluate the Tribe's acute chlorine criterion, three risk characterization methods were used to develop six individual lines of evidence, using available acute toxicity data for brook trout and other salmonid species that served as surrogates for bull trout. Five of the six lines of evidence indicated that the Tribe's acute chlorine criterion is protective of bull trout.

Application of the ACR to the acute EC_A concentrations for surrogate species of bull trout yielded chronic toxicity threshold values above the chronic chlorine criterion in all cases. Exposure to the chronic criterion is also believed protective of bull trout in the Tribe's waters.

Evaluation of chlorine toxicity to other fish species, some of which are potential prey species of bull trout, indicated that both the acute and chronic criteria are protective of all fish species for which empirical toxicity data are available. Evaluation of chlorine toxicity to invertebrate species indicates that although adverse effects have been observed on several invertebrate species at chlorine concentrations lower than the acute and chronic criteria, numerous alternative prey species exist for bull trout with acute and chronic EC_A values above the chlorine criteria.

Based on this information, EPA has determined that the Coeur d'Alene Tribe's chlorine criteria may affect but are **not likely to adversely affect** bull trout.

5.3.7 Summary of Effects of Aquatic Life Toxics Criteria to Bull Trout

Aquatic life criteria were evaluated according to the procedures provided used by EPA (2008) and USFWS (2012) for the Oregon toxics consultation. Criteria for chemicals without known or suspected sources were determined to be NLAA bull trout, consistent with USFWS (2012). These included criteria for all of the legacy pesticides, PCBs, cyanide, and pentachlorophenol.

Metals and chlorine have known or suspected sources to the Reservation TAS Waters. The criteria adopted by the Tribe for metals are the same as Oregon's criteria. In the case of lead, the Tribe has adopted criteria for total lead and Oregon adopted criteria for dissolved lead, but the two are equivalent when EPA's conversion factor is applied [40 CFR 131.36(b)(2)]. For this consultation, EPA has adopted the effects determinations for metals to the extent that they apply to the Reservation TAS Waters. The Oregon toxics consultation did not include chlorine. An effects evaluation for chlorine was completed by EPA and is provided above.

EPA evaluated the effects of approving the Oregon toxics criteria for all of the metals, and found that the approval action was NLAA bull trout for all criteria except the chronic chromium (III) criterion. USFWS determined that the action would be LAA bull trout for several criteria, including arsenic (chronic), nickel (chronic), selenium (chronic), and zinc (acute and chronic). EPA requests formal consultation for its approval action for these five criteria.

5.4 Mixing Zones – WQS Section 12

5.4.1 Federal Regulation and Guidance

States/tribes may, at their discretion, adopt policies in their standards affecting the application and implementation of standards. The Tribe's mixing zone policy establishes requirements which must be followed if the Tribe decides to allow a mixing zone for a point source. If allowed, a mixing zone would be established in the context of an NPDES permit which would be issued by EPA. Therefore, because EPA issues the permits within the action area, site-specific effects are taken into consideration in the development of any NPDES permit. Further, EPA will ensure its obligations under Section 7 of ESA are met with respect to tribally authorized mixing zones.

5.4.2 Tribe's Mixing Zone Policy

Section 12(1) General Conditions states that:

> *(a) The Department may allow a designated portion of a receiving water to serve as a zone of dilution for wastewaters and receiving waters to mix thoroughly and this zone will be defined as a mixing zone.*
>
> *(b) Mixing zones may be granted for whole effluent or on a pollutant by pollutant basis.*
>
> *(c) The allowable size, shape, and location of a mixing zone shall be established in certifications under Section 401 of the CWA, or orders, as appropriate. In determining the location, surface area, and volume of a mixing zone, the Department or EPA may use appropriate mixing zone guidelines (such as EPA /505/2-90-001) to assess the biological, physical, and chemical character of receiving waters, and effluent, and the most appropriate placement of the outfall, to protect instream water quality, public health, and other designated uses.*
>
> *(d) The Department may, as necessary, require mixing zone monitoring studies and/or bioassays and biosurveys as appropriate to be conducted to evaluate water quality or biological status within and outside of the mixing zone boundary.*
>
> *(e) The Department may require revision, revocation or denial of permits authorizing mixing zones upon expiration of the permit, or prior to expiration if information suggests that the nature and impacts of the mixing zone are different than the conditions used to determine mixing zone criteria.*
>
> *(f) No mixing zone shall be granted unless the supporting information clearly indicates the mixing zone would not have a reasonable potential to cause a loss of or impair recovery of aquatic life, wildlife, or sensitive or important habitat; create a barrier to migration of species; or substantially interfere with the existing or designated uses of the water body as a whole; result in damage to the ecosystem; or adversely affect threatened and endangered species or public health as determined by the Department.*
>
> *(g) No Mixing zone shall be granted unless the supporting information clearly indicates that it would not cause lethality to organisms passing through the mixing zone.*
>
> *(h) Mixing zones will not be granted for discharges to outstanding resource waters, wetlands, or ephemeral or intermittent streams.*
>
> *(i) In TAS waters having a mean detention time greater than 15 days, mixing zones shall not be allowed unless it can be demonstrated to the satisfaction of the Department that:*

(A) other siting, technological, and managerial options that would avoid the need for a lake mixing zone are not reasonably achievable;
(B) overriding considerations of the public interest and the Tribe will be served; and,
(C) all technological and managerial methods available for pollution reduction and removal that are economically achievable would be implemented prior to the discharge. Such methods may include, but not be limited to, advanced waste treatment techniques.

(j) The Department shall consider prohibiting mixing zones under the following circumstances:
(A) where discharges could create or foster conditions in sediments within and outside of the mixing zone that have the reasonable potential to cause damage to the ecosystem;
(B) for known or suspected carcinogens, mutagens, teratogens, or bioaccumulative or persistent pollutants;
(C)where discharges could cause an exceedance of the chronic criteria outside of the mixing zone boundary;
(D) where aquatic life could be attracted to the plume and harmed;
(E) where the mixing zone could impact drinking water intakes, recreation sites, cultural areas, and biologically important areas such as fish spawning/nursery areas; and,
(F) where the discharge could adversely impact threatened and endangered species.

(k) Mixing zones shall not be used for, or considered as, a substitute for waste treatment. The applicant shall show, to the satisfaction of the Department, that all reasonable current technology for wastewater treatment, pollution control, and waste reduction have been fully applied before a mixing zone is granted.

(l) Except as specified in "Narrative Water Quality Criteria" (section 4) water quality standards may be exceeded within the mixing zone as provided for in a discharge permit or order. Determination of the dilution available and size of mixing zones will consider the following:
(A) critical conditions;
(B) mixing characteristics of the receiving water;
(C) characteristics of the effluent; and,
(D) impacts to use classifications of the receiving water.

(m) Mixing zones shall be as small as feasible, and shall minimize the adverse effects on the indigenous biological community, especially when species are present that warrant special protection for their cultural significance, economic importance, ecological uniqueness, or for other similar reasons as determined by the Department.

(n) Where mixing zones are adjacent or overlapping, the total size of all mixing zones shall not exceed the size allowed for one mixing zone.

Section 12(2) specifies the design flows/critical low flows to be used for various criteria. Tribes may designate a critical low flow for specific categories of criteria. The low flow values become design flows for sizing treatment plants, developing waste load allocations, and developing water quality-based effluent limits in NPDES permits. Specific low flow requirements are intended to protect designated uses for Reservation TAS Waters against the effects of pollutants. The Tribe has adopted the following design flow provisions relative to aquatic life criteria:

(A) chronic criteria: the 7Q10 flow

The 7Q10 is the lowest 7-day average flow that occurs (on average) once every 10 years, determined hydrologically.

(B) acute criteria: 1Q10 flow

The 1Q10 is the lowest 1-day average flow that occurs (on average) once every 10 years, determined hydrologically.

5.4.3 Effect of Action on Listed Species

Section 12 of the Tribe's WQS specifies that the Tribe will consider the effects of a mixing zone on threatened and endangered species; no mixing zone will be approved that may "adversely affect threatened or endangered species or public safety or health as determined by the Department [Section12(1)(f)]." Additionally the Tribe's mixing zone policy specifically allows the Tribe to prohibit a mixing zone "where the discharge could adversely impact threatened and endangered species [Section 12(1)(j)(F)]."

These mixing zone provisions are more stringent than other state and tribal policies and afford additional protection to threatened and endangered species. This mixing zone provision is consistent with EPA guidance, is intended to be protective of uses, and is consistent with 40 CFR 131.13, which gives states (and tribes) the discretion to establish mixing zone policies. EPA writes and issues the NPDES permits for Coeur d'Alene Reservation TAS Waters and as stated previously that prior to taking any future action, such as the issuance of any NPDES permits containing a mixing zone, will ensure any obligations under Section 7 of ESA are addressed.

In summary: 1) This provision establishes a policy with respect to mixing zones but does not establish mixing zones; 2) any individual mixing zone that is established will be developed on a site-specific basis as part of a new or reissued NPDES permit; and 3) EPA will meet its obligations under Section 7 of the ESA with respect to mixing zones as a part of each individual NPDES permit action. Because the mixing zone policy does not in itself authorize a change to the action area and ESA consultation will be completed when a mixing zone is established, EPA has determined that the approval of these mixing zone provisions is **not likely to adversely affect** bull trout.

5.5 Allowances for Compliance Schedules – WQS Section 15

5.5.1 Federal Regulation and Guidance

A compliance schedule provision is an optional component which can be added to give the Tribe the latitude to set a schedule for a point source discharger to come into compliance with the

WQS. Such schedules have been used in the NPDES program, enabling facilities to add plant upgrades without penalizing these facilities with fines for not meeting WQS during the upgrade process.

Under the CWA, a compliance schedule refers to a schedule of remedial measures included in an NPDES permit, including an enforceable sequence of interim requirements leading to ultimate compliance with the CWA, the implementing regulations, and the NPDES permit itself [See CWA Section 502 (17)]. EPA's requirements for compliance schedules are located at 40 CFR 122.47. If this provision is not included in the Tribe's WQS regulations, compliance schedules cannot be included in NPDES permits written for discharges to the Reservation TAS Waters.

5.5.2 Tribe's Compliance Schedule Provision

(1) NPDES permits issued under federal or tribal authority, and orders and directives of the Department issued under tribal authority for existing discharges or activities may include a schedule for achieving compliance with water quality criteria contained in this chapter. Such schedules of compliance shall be developed to ensure final compliance with all water quality criteria in the shortest practicable time, but not to exceed five years. Decisions regarding whether to issue schedules of compliance will be made on a case-by-case basis by the permitting agency and must be approved by the Department. Schedules of compliance may not be issued for new discharges or activities. Schedules of compliance may be issued to allow for:

(a) construction of necessary treatment capability;
(b) implementation of necessary best management practices;
(c)implementation of additional best management practices for sources determined not to meet water quality criteria following implementation of an initial set of best management practices; and,
(d) completion of necessary water quality studies.

(2) For the period of time during which compliance with water quality criteria is deferred, interim limitations and/or other conditions may be formally established, based on the best professional judgment of the permitting agency and the Department.

(3) Prior to establishing a schedule of compliance, the permitting agency shall require the permittee to evaluate the possibility of achieving water quality criteria via non-construction changes (e.g. facility operation, pollution prevention).

5.5.3 Effect of Action on Listed Species

The compliance schedule provision is consistent with EPA guidance and is consistent with 40 CFR 131.13, which gives states (and tribes) the discretion to establish general policies. Compliance schedules, when authorized and granted, are a component of an NPDES permit. If a compliance schedule is deemed appropriate, the length of the compliance schedule and specific conditions of the compliance schedule are determined on a permit by permit basis.

In summary: 1) This provision establishes a policy with respect to compliance schedules but does not establish compliance schedules; 2) any compliance schedule that is established will be developed on a site-specific basis as part of a new or reissued NPDES permit; and 3) EPA will meet its obligations under Section 7 of the ESA with respect to compliance schedules as a part of each individual NPDES permit action. Because the compliance schedule policy does not in itself authorize a change to the action area and ESA consultation will be completed when a compliance schedule is established, EPA has determined that the approval of these compliance schedule provisions is **not likely to adversely affect** bull trout.

5.6 Water Use Classification – WQS Sections 18, 20 and 21

5.6.1 Federal Regulation and Guidance

Water quality criteria are the second required element in state/tribe WQS regulations, after designating uses of the water body. States/tribes set criteria that will provide the conditions necessary to support the designated uses. EPA publishes criteria documents as guidance for states/tribes. States/tribes consider these criteria documents, along with the most recent scientific information, when adopting regulatory criteria. The Federal WQS regulation at 40 CFR 131.11 requires that states and authorized tribes establish criteria to protect designated uses.

5.6.2 Tribe's General Provision for Bull Trout and Cutthroat Trout Aquatic Life Designated Use

The Coeur d'Alene Tribe adopted a number of designated use categories, including a general aquatic life use provision, in Section 18 of their WQS. The Tribe also adopted language stating that they will consider the WQS of downstream waters and ensure that the Tribal standards provide for the attainment and maintenance of WQS downstream. Subsection 4 is specific to an aquatic life use:

> *(4) Aquatic Life Uses*
>
> *(a) Bull Trout and Cutthroat Trout. Surface waters used for, or naturally suitable as habitat for bull trout and cutthroat trout.*

Sections 20 and 21 of the Tribe's WQS both apply this aquatic life use to all of the Reservation TAS Waters.

5.6.3 Effect of Action on Listed Species

This use classification provision is consistent with 40 CFR 131.10, and is intended to provide for aquatic life protection with specific reference to bull trout. EPA has determined that the proposed approval of the Coeur d'Alene Tribe's general aquatic life use provision **is not likely to adversely affect** bull trout.

5.7 Specific Water Quality Criteria for Use Classifications – WQS Section 19

5.7.1 Federal Regulation and Guidance

EPA's WQS regulations require states and tribes to adopt water quality criteria that will protect the designated uses of a water body, as discussed above in Section 5.2. The state/tribe must designate uses for each water body, including existing and desired uses of the waters. Designated uses were defined in Sections 18, 20, and 21 of the Tribe's WQS, as discussed in Section 5.6. Criteria provided in Section 19 of the Coeur d'Alene Tribe's WQS were designed to protect various specific uses, including protection of aquatic life (i.e., bull trout and cutthroat trout).

5.7.2 Tribe's Specific Criteria for the Bull Trout and Cutthroat Trout Aquatic Life Use

The Tribe has adopted specific numeric water quality criteria for pH, dissolved oxygen (DO), temperature, and turbidity in support of the designated use of bull trout and cutthroat trout habitat. This use applies to all of the Reservation TAS Waters, and the criteria for pH, DO, and temperature also apply to the Reservation TAS Waters (i.e., the St. Joe River and Coeur d'Alene Lake within the boundaries of the Reservation). The criteria for DO and temperature also include site-specific criteria for the hypolimnion of the lake during times when the lake is stratified, generally June through September. These criteria are based on natural conditions at the time the lake becomes stratified. These criteria apply to any stratified sections of St. Joe River, as well.

(4) Aquatic Life Uses. Waters designated for specific aquatic life uses are subject to the following criteria.

(a) Bull Trout and Cutthroat Trout.

(i) pH. pH shall be within the range of 6.5 to 8.5, with a human caused variation within this range of less than 0.5 units over any 24-hour period.

(ii) Dissolved Oxygen. Dissolved oxygen (DO) shall exceed 8.0 mg/L at all times. From June 1 to September 30 DO shall be determined by natural conditions at the time of stratification. In the event natural conditions are less than 8mg/L at the time of stratification the natural condition found at that time (for that time period only) will become the standard.

(A)Natural Conditions for DO and Temperature. When TAS waters stratify (usually in June) the average whole water column DO content and temperature at the time of stratification shall be considered the natural condition (for DO and temperature only)
(B) In TAS waters greater than 15 meters this standard applies to the bottom (deepest) 80 percent of the water column present below the metalimnion. In TAS waters less than 15meters and greater than 8 meters this standard applies to only the bottom 50

percent of the water column present below the metalimnion. TAS waters exhibiting total water column depths less than 8 meters are not expected to maintain a stable stratified condition and are therefore exempt from this standard

(iii) Temperature. From June 1, through September 30, The 7-day average of the daily maximum temperatures within the hypolimnion is not to exceed 16 °C from June 1 to September 30.

In thermally stratified TAS waters the hypolimnetic temperature shall be determined by natural conditions as defined in Chapter 4, (a), (ii), (A) of these standards. In TAS waters greater than 15 meters this standard applies to the bottom 80 percent of the lake water column present below the metalimnion. In TAS waters less than 15 meters and greater than 8 meters this standard applies to only the bottom 50 percent of the water column present below the metalimnion. TAS waters exhibiting total water column depths less than 8 meters are not expected to maintain a stable stratified condition and are therefore exempt from this standard

(iv) Turbidity. Turbidity shall not exceed 5 NTU over natural background levels when the natural background turbidity is 50 NTU or less, or have more than a 10 percent increase in turbidity when the natural background level is more than 50 NTU. Natural background turbidity for implementing this criteria is to represent the 90th percentile value of the annual average turbidity.

5.7.3 Effect of Action on Listed Species

pH

The life stages of fish most sensitive to effects from pH are spawning, egg incubation, and alevin/fry development. These life stages of bull trout are not present in the Reservation TAS Waters. A review of the effects of pH on fresh water fish published by the European Advisory Commission states that although there is no definite range at which a fishery is unharmed and outside which is damaged, the pH range which is not directly lethal to fish is 5.0 - 9.0 (EPA, 1986b). Although pH in the range of 5.0 - 6.5 is unlikely to be harmful to fish, it may be harmful if free CO_2 concentrations are greater than 20 ppm or if the water contains iron salts which are precipitated as ferric hydroxide.

In the development of EPA's (1976, 1986) criteria (6.5 - 9.0, freshwater chronic exposure), two bioassay references on freshwater fish cited by EPA showed a lower limit of about 6.5 for normal development (EIFAC, 1969; Mount 1973, IN EPA, 1986). Vulnerable life stages of chinook salmon are sensitive to pH levels below 6.5 and possibly at pH levels greater than 9.0 (Marshall et al., 1992). For chinook salmon, Rombough (1986) reported that low pH decreases egg and alevin survival, but specific values are lacking. Adult salmonids are at least as sensitive as most other fish to low pH; these species include rainbow, brook and brown trout, and chinook salmon (ODEQ, 1995). The critical value of pH for rainbow trout presence, at the low end, is about 5.5 (Baker et al., 1990). Considering the salmonid food base, some insect larvae including those of the mayfly, stonefly, and caddis fly are sensitive to pH levels in the range of 5.5 to 6.0 (ODEQ, 1995).

At the higher end of the pH scale, even less is known regarding effects on fish. In EPA's review for water quality criteria development, the upper limit of 9.0 was obtained from only one reference (EIFAC, 1969). The larvae of aquatic insects were apparently more tolerant than fish. No recent data exist, but studies conducted earlier in the early 1900's show salmonids, including both trout and salmon species, to be sensitive to pH levels in the range of 9.2 to 9.7, depending on the life stage (ODEQ, 1995). Non-salmonid fishes are, with some exceptions, more tolerant of high pH, with sensitivity appearing at or over pH 10 for most species tested (EIFAC, 1969). Levels of pH greater than 9.0 may adversely affect benthic invertebrate populations, thereby altering the food base for salmonids. A pH of 9.0 seems to be the cutoff for the start of noticeable adverse effects for some species of salmonids and invertebrates. The Tribe's criterion for pH provides an upper limit of 8.5. In addition, the Tribe's WQS limit changes in pH due to anthropogenic activities to no more than 0.5 pH unit over 24 hours.

Based on the above information, the criterion for pH is **not likely to adversely affect** bull trout**.**

Dissolved Oxygen
EPA has published dissolved oxygen criteria for various taxonomic and life stage classifications. The recommended one day minimum dissolved oxygen criterion is 8.0 mg/L for early life stages of cold water fish (EPA, 1986). This criterion was developed under the assumption that the colder waters contain a population of one or more species in the family Salmonidae (EPA, 1986). The Tribe's dissolved oxygen criterion for freshwater is consistent with the EPA's guidance for cold waters protective of early life stages of salmonids (EPA, 1986). The criterion would also be protective of the less sensitive migrating adult and subadult salmonids found in the Reservation TAS Waters.

The site-specific dissolved oxygen criteria for the hypolimnion of stratified waters are determined by ambient conditions at the time of stratification every spring. Although dissolved oxygen in the hypolimnion is likely to decrease somewhat over the course of the summer even in the absence of anthropogenic inputs of oxygen-consuming materials, the dissolved oxygen criteria are a conservative goal and would be protective of bull trout to the extent natural or background conditions would allow.

Based on this information, the dissolved oxygen criteria are **not likely to adversely affect** the life stages of bull trout found in Reservation TAS Waters.

Temperature
EPA publishes nationally recommended water temperature criteria to protect aquatic life. The freshwater temperature criterion outlines developing upper temperature limits based on the important sensitive species found within the waters to be protected (*The Gold Book*, 1986). The *EPA Region 10 Guidance for Pacific Northwest State and Tribal Temperature Water Quality Standards* (2003, EPA 910-B-03-002) provides such upper temperature limits to protect the important and sensitive salmonid populations found within the Pacific Northwest.

The Coeur d'Alene Tribe's temperature criterion corresponds with the EPA criteria recommendation in the *EPA Region 10 Guidance for Pacific Northwest State and Tribal Temperature Water Quality Standards* (2003, EPA 910-B-03-002) for salmon and trout "core" juvenile rearing (16°C 7 day average daily maximum). This criterion is recommended to "(1) safely protect juvenile salmon and trout from lethal temperatures; (2) provide upper optimal conditions for juvenile growth under limited food during the period of summer maximum temperatures and optimal temperatures for other times of the growth season; (3) avoid temperatures where juvenile salmon and trout are at a competitive disadvantage with other fish; (4) protect against temperature-induced elevated disease rates; and (5) provide temperatures that studies show juvenile and trout prefer and are found in at high densities." EPA Region 10 guidance recommends this temperature criterion for waters where adult and subadult bull trout foraging and migration occurs during the period of summer maximum temperatures.

The *Region 10 Guidance for Pacific Northwest State and Tribal Temperature Water Quality Standards* (2003, EPA 910-B-03-002) was developed in consultation with the USFWS and NOAA. FWS has indicated that criteria consistent with these recommendations are likely to be protective of listed species and thus facilitate or expedite consultation if adopted by a state or tribe in Region 10 (USFWS, 2003). The scientific rationale and basis for EPA's determination that its recommended temperature criteria are protective of the various life stages to which they correspond are described in the Temperature Guidance and the six supporting Technical Issue Papers.

The site-specific temperature criteria for the hypolimnion of stratified waters are determined by ambient conditions at the time of stratification every spring. Although temperatures in the hypolimnion are likely to rise somewhat over the course of the summer even in the absence of anthropogenic heat inputs, the temperature criteria are a conservative goal and would be protective of bull trout to the extent natural or background conditions would allow.

Based on this information, the temperature criteria are **not likely to adversely affect** bull trout.

Turbidity

Data addressing the impacts of various levels of turbidity on salmonids is widely available. Newcombe and MacDonald (1991) found that sediment can affect salmonids through lethal, sublethal and behavioral impacts. Physiological effects include gill trauma, increased levels of blood glucose, plasma glucose, plasma cortisol, osmoregulatory ability, and reproduction and growth.

The Tribe's turbidity criteria are based on the increase of turbidity over natural background. Only one study was found that addresses this situation. In trying to determine the protectiveness of Alaska's turbidity criterion for salmonids, Lloyd (1987) assessed the impacts of turbidity increases of 25 or 5 NTU over naturally occurring background in clear water streams. Based on a review of existing data, it was determined that a "moderate" level of protection roughly translates into turbidity increases of up to 23 NTUs above natural conditions for the protection of fish and wildlife. A "high" level of protection is roughly translated into values ranging up to 7 NTUs above background. These data would indicate that the Tribe's turbidity criterion of

5 NTU over natural background would provide a high level of protection for salmonids. The Tribe's turbidity criterion allowing up to a 10% increase in turbidity when natural background turbidity is more than 50 NTU would provide moderate protection until 230 NTU based on Lloyd (1987). A "moderate" level of protection would occur at a natural background of 50 NTU (as a 10% increase over a natural background of 230 NTU equals 23 NTU).

In addition, salmonid strategies for coping with turbid waters include using off-channel, clean-water refugia and temporary holding at clean water tributary mouths. Based on this information, adult bull trout will most likely avoid the high turbidity waters prior to the point where adverse impacts would occur. It should be noted that Lloyd (1987) based part of his conclusion on data converting suspended sediment data into a rough estimate of turbidity (NTU). However, as no other data addressing the protective ranges of turbidity over natural background was found, this is the best available data addressing the Tribe's turbidity criterion.

Aquatic species are adapted to variations in turbidity. Tolerance to brief periods of high sediment levels or turbidity is a trait essential to survival in an environment where high flow events and capricious floods can result in dramatic increases in turbidity (Rowe et al, 2003, Gammon, 1970). Short term exposures to very high turbidity and suspended solids levels (100,000 mg/L) have been demonstrated to have no lasting effect on aquatic species (Wallen, 1951).

The criterion does not state a frequency or duration for which the increase in turbidity can occur. Presently there are only two point sources discharging into Reservation TAS Waters (Potlatch Corp. and City of St. Maries POTW). Increases in turbidity may occur on a seasonal basis, but presently not from any permitted discharges into Reservation TAS Waters. The application of the turbidity criteria would occur through NPDES permits and TMDLs. EPA currently administers the NPDES and TMDL Programs on the Reservation. Any increase in turbidity allowed by a new or revised NPDES permit issued by EPA would be part of the consultation for issuance of the NPDES permit if EPA determines that the action may affect ESA-listed threatened or endangered species.

Therefore, the EPA has determined that the approval of the turbidity criteria established by the Coeur d'Alene WQS is **not likely to adversely affect** bull trout.

6 Summary of Effects Determinations

The effects determinations for sections of the Coeur d'Alene Tribe's WQS that are addressed in this BE are summarized below in Table 6.1. Effects conclusions for the individual toxics criteria are provided in Table 5.2. EPA requests formal consultation for the following criteria: arsenic (chronic), nickel (chronic), selenium (chronic), and zinc (acute and chronic), based on USFWS's effects determinations for these criteria in Oregon (USFWS 2012).

Table 6.1. Effects Determinations for WQS Provisions

Provision under Consultation	Effects Determination
Narrative Criteria (Sections 3.1, 5, 7.1, 9, 10, and 11)	NLAA
Toxic Substances (Sections 7.2, 7.3, 7.6, 7.7 and 7.8)	NLAA
Toxic Substances – Aquatic Life Criteria (Sections 7.10 and 7.11)	NLAA; request formal consultation for 5 criteria (see Table 5.2)
Mixing Zones (Section 12)	NLAA
Allowances for Compliance Schedules (Section 15)	NLAA
Specific Water Quality Criteria for Aquatic Life Use Classifications (Section 19)	
pH	NLAA
Dissolved Oxygen	NLAA
Temperature	NLAA
Turbidity	NLAA

7 Analysis of Effects to Critical Habitat

7.1 Description of Critical Habitat in the Action Area

USFWS has designated all waters in the action area as critical habitat for bull trout. These waters are part of Critical Habitat Unit 29, the Coeur d'Alene River Basin (75 FR 63898).

7.2 Coeur d'Alene River Basin Bull Trout

Section 7 of the ESA and its implementing regulations at 50 CFR Part 402 require EPA to determine whether the action is likely to "destroy or adversely modify the designated critical habitat of the listed species." The consultation regulations define the statutory term "destruction or adverse modification" of critical habitat as "*...a direct or indirect alteration that appreciably diminishes the value of critical habitat for both the survival and recovery of a listed species. Such alterations include, but are not limited to, alterations adversely modifying any of those physical or biological features that were the basis for determining the habitat to be critical.*"

The final rule on critical habitat for the Columbia River bull trout (75 FR 63898) designates the following primary constituent elements for critical habitat as follows (75 FR 63898, pp. 63931-63932):

> (1) Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality and quantity and provide thermal refugia.
> (2) Migration habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent, or seasonal barriers.
> (3) An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.
> (4) Complex river, stream, lake, reservoir, and marine shoreline aquatic environments, and processes that establish and maintain these aquatic environments, with features such as large wood, side channels, pools, undercut banks and unembedded substrates, to provide a variety of depths, gradients, velocities, and structure.
> (5) Water temperatures ranging from 2 to 15 °C (36 to 59 °F), with adequate thermal refugia available for temperatures that exceed the upper end of this range. Specific temperatures within this range will depend on bull trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shading, such as that provided by riparian habitat; streamflow; and local groundwater influence.
> (6) In spawning and rearing areas, substrate of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival. A minimal amount of fine sediment, generally ranging in size from silt to coarse sand, embedded in larger substrates, is characteristic of these conditions. The size and amounts of fine sediment suitable to bull trout will likely vary from system to system.

> (7) A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, minimal flow departure from a natural hydrograph.
> (8) Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.
> (9) Sufficiently low levels of occurrence of nonnnative predatory (e.g., lake trout, walleye, northern pike, smallmouth bass); interbreeding (e.g., brook trout); or competing (e.g., brown trout) species that, if present, are adequately temporally and spatially isolated from bull trout.

The Tribe's adoption of general conditions, narrative criteria, aquatic life criteria, a mixing zone policy, a compliance schedule provision, designated uses and specific criteria for the designated use classifications are all not expected to affect most of the essential features of critical habitat. The Tribe's WQS may affect the following features of the PCEs: An abundant food base (PCE 3); water temperatures (PCE 5); and water quality sufficient to support bull trout growth and survival (PCE 8 as it applies to bull trout FMO habitat; water quality relative to bull trout reproduction does not apply to the action area).

EPA (2008) compared the toxicity effects thresholds for all available prey species to Oregon's criteria to predict effects that exposure at the toxics criteria levels would have to prey species. This approach was used to determine the availability of prey to bull trout. The effects thresholds of a small number of prey species were below the acute and/or chronic criteria for many of the metals, and the criteria may not be protective of every individual prey species. However, bull trout are opportunistic feeders, and the criteria were protective of most of the prey species for every metal at the acute and chronic criteria levels. EPA (2008) concluded for each metal that exposure at the acute and chronic criteria is not likely to result in a demonstrable reduction in prey abundance for bull trout. The criteria are sufficient to protect an abundant food base and EPA's approval of the criteria is **not likely to destroy or cause an adverse modification to designated critical habitat** of bull trout.

The Tribe has adopted criteria for water temperatures to protect bull trout and cutthroat trout. These are evaluated above in Section 5.7. The criteria are based on temperatures that will protect bull trout FMO habitat and on natural conditions and would be expected to protect the critical habitat. The Tribe's maximum temperature of 16 °C is sufficient to protect the FMO habitat in the action area. The action area does not include spawning habitat. Cold waters are available in the central and northern areas of Coeur d'Alene Lake throughout the summer. Therefore, EPA approval of the Tribe's temperature criteria are **not likely to destroy or cause an adverse modification to designated critical habitat** of bull trout.

Exposure to pollutants through food and water may affect the growth or survival of bull trout. These effects are described above in Section 5.3. Formal consultation is requested to address effects of several criteria on bull trout, including arsenic (chronic), chromium (III) (chronic), nickel (chronic), selenium (chronic), and zinc (acute and chronic).

8 Cumulative Effects

Cumulative effects include the effects of future actions on threatened or endangered species or proposed critical habitat that are reasonably certain to occur in the action area considered in this assessment. Future actions on tribal lands that are not related to the proposed approval of the Tribe's WQS are not considered in this section.

Future anticipated non-Federal actions that may occur in or near Reservation TAS Waters include timber harvest, grazing, mining, agricultural practices, urban development, municipal and industrial wastewater discharges, road building, sand and gravel operations, introduction of nonnative fishes, off-road vehicle use, fishing, hiking, and camping. These non-Federal actions are likely to continue having effects on endangered and threatened species.

Non-Federal actions are also likely to occur in or near Reservation TAS Waters that are likely to have beneficial effects on bull trout. These include implementation of riparian improvement measures, best management practices associated with timber harvest, grazing, agricultural activities, urban development, road building and abandonment, recreational activities, and additional nonpoint-source pollution controls.

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Appendix A

Water Quality Standards for the Reservation TAS Waters of the Coeur d'Alene Tribe

Appendix A: Water Quality Standards for the Reservation TAS Waters of the Coeur d'Alene Tribe

Appendix A includes the Coeur d'Alene Tribe's WQS as adopted by the Tribe and submitted to the EPA for approval action in 2010. The Tribe is currently preparing non-substantive revisions to their WQS and expects to provide these to the EPA shortly. The revisions have been discussed between the Tribe and the EPA, and the EPA has incorporated the anticipated changes into the main text of the BE. The WQS revisions do not alter the meaning or intent of any of the WQS provisions or criteria, but provide clarifications and editorial adjustments. The changes will not affect the process or outcome of this ESA consultation. The EPA will provide the revised WQS to the USFWS as an addendum to the BE when they are received from the Tribe.

WATER QUALITY STANDARDS FOR APPROVED SURFACE WATERS OF THE COEUR D'ALENE TRIBE

2010

Prepared for: The United State's Environment Protection Agency (Region 10)

Prepared by: The Coeur d'Alene Tribe's Lake Management Department

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WATER QUALITY STANDARDS FOR APPROVED SURFACE WATERS OF THE COEUR D'ALENE TRIBE

1. INTRODUCTION

(1) Aware of the terms of the Executive Orders of 1867 and 1873, federal recognition in the Federal Register, December 29, 1988 and the Tribal Constitution and By-Laws, ratified June 5, 1947 as amended, all of which provide that the Coeur d'Alene Indian Reservation shall be reserved by the United States for the purpose of establishing an independent exclusive political and economic community for the Coeur d'Alene Tribe and its members; the Coeur d'Alene Tribe hereby establishes these water quality standards covering those surface waters of Coeur d'Alene Lake and the St. Joe River within the exterior boundaries of the 1894 Coeur d'Alene Reservation. (Referred to herein as "Reservation TAS Waters"). These standards shall provide a mechanism for managing and regulating the quality and use of said waters by establishing the water quality goals for specific waterbodies, and providing a legal basis for regulatory controls.

(2) These standards have been adopted pursuant to Sections 303 and 518 of the Clean Water Act and Chapter 42 of the Coeur d'Alene Tribal Code. These standards shall serve to protect the public health and welfare, enhance the quality of waters of the Coeur d'Alene Tribe, and serve the purposes of the Clean Water Act.

(3) The purposes of these water quality standards are to restore, maintain and protect the chemical, physical, biological, and cultural integrity of Coeur d'Alene Reservation TAS Waters; to promote the health, social welfare, and economic well-being of the Coeur d'Alene Tribe, its people, and all the residents of the Coeur d'Alene Reservation; to achieve a level of water quality that provides for all cultural uses of the water, the protection and propagation of fish and wildlife, for recreation in and on the water, and all existing and designated uses of the water; to promote the holistic watershed approach to management of Reservation TAS Waters of the Coeur d'Alene Tribe; to provide for the protection of threatened and endangered species and to provide necessary guidance for the protection and/or maintenance of water quality throughout Reservation TAS waters.

(4) These standards are designed to establish the uses for which the Reservation TAS Waters shall be protected, to prescribe water quality standards (narrative and numeric) to sustain the designated uses, and to protect existing water quality.

(5) The water use and quality criteria set forth herein are established in conformance with water uses of Coeur d'Alene Reservation TAS Waters and in consideration of the natural water quality potential and limitations of the same.

2. DEFINITIONS

The following definitions are intended to facilitate the use of this chapter.

"Acute toxicity" refers to a stimulus severe enough to rapidly induce an effect; in aquatic toxicity tests, an effect observed in 96-hours or less is typically considered acute. When referring to aquatic toxicology or human health, an acute effect is not always measured in terms of lethality.

"Appropriate reference site or region" means a site on the same waterbody or within the same basin or eco-region that has similar habitat conditions and which is expected to represent the water quality and biological community attainable in the absence of human caused disturbances within the area(s) of concern.

"Aquatic species" means any plant or animal, which lives at least part of their life cycle in water.

"Best management practices (BMP)" means physical, structural, and/or managerial practices that, when used singularly or in combination, prevent or reduce pollution.

"Bioaccumulation" means the process by which a compound is taken up by and accumulates in an aquatic organism, from water, food, and sediments.

“Bioaccumulative chemicals” are any chemical that accumulates in aquatic organisms by a human health bioaccumulation fac tor greater than 1000 and has the potential upon entering surface waters to cause adverse effects, either by itself or in a form of its toxic transformation product, as a result of that accumulation.

"Biological assessment" is an evaluation of the biological condition of a water body using surveys of aquatic community structure, function, diversity, presence or absence, or other direct measurements of resident biota in surface waters.

"Biological criteria" means numerical values or narrative expressions that describe the biological integrity or aquatic communities inhabiting waters of a given designated aquatic life use. Biological criteria serve as an index of aquatic community health.

"Carcinogen" means any substance or agent that produces or tends to produce cancer in humans. For implementation of this chapter, the term carcinogen will apply to substances on the EPA lists of A (known human), B (probable human), and C (possible human) carcinogens.

"Chapter" means the *Water Quality Standards for Approved Surface Waters of the Coeur d’Alene Tribe* as set forth within this regulation.

"Chronic toxicity" means an adverse effect to an organism caused by a fairly long-term exposure (when compared to the life span of the organism) to a pollutant. These effects include changes in feeding, growth, metabolism, reproduction, and genetic mutations. Short-term test methods for detecting chronic toxicity may be used.

"Constructed wetlands" means those wetlands intentionally created from non-wetland sites for the primary purpose of wastewater or stormwater treatment.

"Created wetlands" means those wetlands intentionally created from non-wetland sites to produce or replace natural wetland habitat.

"Critical condition" is when the physical, chemical, and biological characteristics of the receiving water environment interact with the effluent to produce the greatest potential adverse impact on aquatic biota and existing or characteristic water uses. For steady-state discharges to riverine systems the critical condition may be assumed to be equal to the 7Q10 flow event unless determined otherwise by the department.

"Cultural water use" means those water uses necessary to support and maintain the way of life of the Coeur d'Alene People including, but not limited to: use for sufficient flow for fish survival, and wildlife needs, and preservation of habitat for berries, roots, medicines and other vegetation significant to the values of the Coeur d'Alene People. Cultural water uses also include ceremonial activities involving Native American spiritual and cultural practices which may involve intimate contact with water and consumption of water. This shall include uses of a waterbody to fulfill cultural, traditional, spiritual, or religious needs of the Coeur d'Alene Tribe, as approved by the Coeur d'Alene Tribe.

"CWA" means the federal Clean Water Act (33 USC 1251 et seq.), as amended.

"Damage to the ecosystem" means any demonstrated or predicted stress to aquatic or terrestrial organisms or communities of organisms which the Department concludes may interfere with the health or survival success or natural structure and functioning of such populations. This stress may be due to alteration in habitat or changes in water temperature, chemistry, or turbidity, or other causes. In making a determination regarding ecosystem damage, the Department shall consider the cumulative effects of pollutants or incremental changes in habitat that may create stress over the long term.

"Department" means the Coeur d'Alene Tribe's Lake Management Department
.
"Director" means the Director of the Coeur d'Alene Tribe's Lake Management Department.

"Designated use" means a use that is specified in water quality standards as a goal for a waterbody segment, whether or not it is currently being attained.

"E. coli": Escherichia coli means that portion of the coliform bacteria group, which is present in the intestinal tract, and feces of warm-blooded animals. E. coli is used as a direct indicator of human or animal caused fecal contamination in water. Presence of significant levels of E. coli in the water has been linked to gastroenteristis in humans.

"EPA" means the United States Environmental Protection Agency.

“Epilimnion” means the top-most layer in a thermally stratified lake, occurring above the deeper hypolimnion.

"Existing uses" means all uses actually attained in the water body on or after November 28, 1975, whether or not they are explicitly stated as designated uses in the water quality standards or presently exist.

"Geometric mean" means either the nth root of a product of n factors, or the antilogarithm of the arithmetic mean of the logarithms of the individual sample values.

"Hardness" means a measure of the calcium and magnesium salts present in water. For the purpose of this chapter, hardness is measured in milligrams per liter and expressed as calcium carbonate ($CaCO_3$).

“Hypolimnion” means the lowest, (usually coldest) layer of a stratified lake and lies below the metalimnion and epilimnion.
"Intermittent stream" means a waterway, which flows only at certain times of the year or does not flow continuously.

"Mean detention time" means the time obtained by dividing a reservoir's mean annual minimum total storage by
the thirty-day ten-year low-flow from the reservoir.

“Metalimnion” means the middle layer of a stratified lake it lies below the epilimnion and above the hypolimnion. The metalimnion is usually characterized by showing a rapid temperature drop (1 degree C/1 meter in depth change) with increasing depth.
"mg/L" means milligrams per liter.

"Migration or translocation" means any natural movement of an organism or community of organisms from one locality to another locality.

"Mixing Zone" means that portion of water body adjacent to a point source discharge where mixing results in the dilution of the effluent with the receiving water. Water quality numeric criteria may be exceeded in a mixing zone as conditioned and provided for in section 12.

“Mutagen” means substances or chemicals with the ability to increase the frequency or extent of a significant and basic alteration in an organism’s chromosomes or genetic material as determined according to the United States Environmental Protection Agency Guidelines for Mutagenicity Risk Assessment, 51 Fed. Reg. 34006 (1986)

"Natural background" or "Natural conditions" means surface water quality that would be present without human-caused pollution. When assessing natural background conditions in the headwaters of a disturbed watershed it may be necessary to use the natural background conditions of a neighboring or similar watershed as a reference condition.

"Near Instantaneous and Complete Mix" means no more than a 10 percent difference in bank-to-bank concentrations within a longitudinal distance not greater than 2 stream/river widths.

"Nonpoint source" means pollution that enters any waters from any dispersed land-based or water-based activities, including but not limited to, atmospheric deposition, surface water runoff from agricultural lands, urban areas or forest lands; subsurface or underground sources; or discharges from boats or marine vessels not otherwise regulated under the National Pollutant Discharge Elimination System program.

"NPDES" means National Pollutant Discharge Elimination System, the national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under sections 307, 402, 318, and 405 of the CWA.

"NTU" means as nephelometric turbidity units (NTU) and measured with a calibrated turbidimeter.

"ppm" means parts per million.

"Permit" means a document issued pursuant to tribal code or federal laws (such as NPDES, CWA, Section 401; CWA, Section 404) specifying the waste treatment and control requirements and waste discharge conditions.

"Persistent pollutant" means a pollutant which is slow to or does not decay, degrade, transform, volatilize, hydrolyze, or photolyze. A chemical with a half-life greater than two months in the water column, sediment and biota.

"Person" means any individual or group or combination thereof acting as a unit, however associated; any organization of any kind, whether organized for profit or not, and regardless of the form in which it does business, whether as a sole proprietorship, partnership, joint venture, trust, unincorporated association, corporation, government, including any part, subdivision, or agency of any of the foregoing, or otherwise; and any combination of individuals or organizations in whatever form, and the plural as well as the singular number.

"pH" means the negative logarithm of the hydrogen ion concentration.

"Point source" means any discernible, confined and discrete conveyance, including, but not limited to, any pipe, ditch, channel, sewer, tunnel, conduit, well, discrete fissure, container, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged.

"Pollutant" includes dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials (except those regulated under the Atomic Energy Act of 1954, as amended (42 U.S.C. 2011 et seq.)), heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water.

"Pollution" includes such contamination, or other alteration of the physical, chemical or biological properties, of any waters of the Tribe, including change in temperature, taste, color, turbidity, or odor of the waters, or such discharge of any liquid, gaseous, solid, radioactive, or other substance into any waters of the Tribe as will or is likely to create a nuisance or impair any beneficial use of such waters.

"Receiving waters" means any watercourse or water body that receives treated or untreated wastewater.

"Reservation" means all lands within the exterior boundaries of the Coeur d’Alene Reservation.

"Reservation Waters" or “Coeur d’Alene Reservation Waters” includes lakes, rivers, ponds, streams (including intermittent and ephemeral streams), wetlands, and all other surface waters and water courses within the exterior boundaries of the 1894 Coeur d’Alene Reservation. These waters are portrayed in Map Attachments 1 through 4 hereto and referred to therein as “Reservation Waters.”

"Reservation TAS Waters” or “Coeur d’Alene Reservation TAS Waters” means waters that are a distinct yet connected sub-set of the “Reservation Waters” and for which EPA has expressly approved the *Water Quality Standards for Approved Surface Waters of the Coeur d'Alene Tribe* under section 303 of the CWA and affirmed the Tribes authority to set water quality standards under section 518(e) of the CWA. These waters are portrayed in Map Attachments 1 through 4 hereto and referred to therein as “Reservation TAS Waters.” EPA’s approval of the Tribe’s water quality standards and confirmation of the Tribe’s authority to regulate water quality on these waters does not in any way release the Coeur d'Alene Tribe’s claim to sole authority to regulate all Coeur d’Alene Reservation Waters and all Disputed Waters.

“Disputed Waters” means all navigable waters within the exterior boundaries of the 1873 Coeur d’Alene Reservation over which the Coeur d’Alene Tribe maintains claims to jurisdiction, including, but not limited to, the Coeur d’Alene River downstream from Cataldo, including the lateral lakes, the southern half of the Spokane River to the Washington State border, and Coeur d’Alene Lake, to the extent not addressed by the decision in *Idaho v. United States*, 121 S.Ct. 2135 (2001). A portion of these waters are portrayed in Map Attachments 1 through 4 hereto and referred to therein as “Disputed Waters.”

"Reference aquatic community" means aquatic life expected to exist in a particular habitat when water quality standards for a specific eco-region, basin, or water body are met. This shall be established by accepted biomonitoring techniques and comparison with aquatic communities occurring in appropriate reference sites within the eco-region.

"Stormwater" means that portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, pipes, and other features of a stormwater drainage system into a defined surface waterbody, or a constructed infiltration facility.

"Temperature" means water temperature expressed in degrees Celsius (^{o} C).

“Teratogen” means substances or chemicals with the ability to cause developmental malformations and monstrosities, as determined according to the United States Environmental Protection Agency Guidelines for Health Assessment of Suspect Developmental Toxicants, 51 Fed. Reg. 34028 (1986),

"Threatened or endangered species (listed species)" means any species of fish, wildlife, or plant which has been determined to be endangered or threatened under section 4 of the Endangered Species Act. Listed species are found in 50 CFR 17.11.-17.12.

"Toxicity" means acute or chronic toxicity.

"Toxicity test" means a test using selected organisms to determine the acute or chronic effects of a chemical pollutant or whole effluent.

"Toxic pollutant" means those pollutants, or combinations of pollutants, which after discharge and upon exposure, ingestion, inhalation or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will, on the basis of information available to EPA or the Department, cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological malfunctions (including malfunctions in reproduction) or physical deformations, in such organisms or their offspring.

"Tribal Council" means the governing body of the Coeur d'Alene Tribe which has been empowered to act for and on behalf of the Coeur d'Alene Tribe pursuant to the revised Constitution and By-Laws, adopted by the Coeur d'Alene Tribe by referendum November 10, 1984, and approved by the Secretary of the Interior, Bureau of Indian Affairs, December 21, 1984.

"Tribe" means the Coeur d'Alene Tribe.

"Turbidity" means the clarity of water expressed as nephelometric turbidity units (NTU) and measured with a calibrated turbidimeter.

"ug/L" means micrograms per liter.

"Wastes" include sewage, industrial wastes, and all other liquid, gaseous, solid, radioactive, or other substances which will or may cause pollution or tend to cause pollution of any water body.

"Water quality" means the chemical, physical, biological, and cultural characteristics of a waterbody.

"Wetland" means any area that is inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances does support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

"Wildlife habitat" means the waters of the Tribe used by, or that directly or indirectly provide food support to, fish, other aquatic life, and wildlife for any life history stage or activity.

"Zone of initial dilution" means the region of initial mixing surrounding or adjacent to the outfall pipe or diffuser port, in which dilution is caused by the momentum and buoyancy of the discharge.

3. GENERAL CONDITIONS

The following conditions shall apply to the water quality criteria and classifications set forth herein.

(1) All Reservation TAS Waters shall be free from pollutants in concentrations or combinations that do not protect the most sensitive use of the water body, except as provided for under Mixing Zones (section 12).

(2) Whenever the natural conditions of Reservation TAS Waters are of a lower quality than the criteria assigned, the Department may determine that the natural conditions shall constitute the water quality criteria, following the procedures set forth in Section 4.

(3) At the boundary between waters of different classifications, the more stringent water quality criteria shall prevail. When a distinction cannot be made among surface water, wetlands, groundwater, or sediments, the applicable standards shall depend on which existing or designated use is, or could be, adversely affected. If existing or beneficial uses of more than one resource are affected, the most protective criteria shall apply.

(4) The Department may revise criteria on an area-wide or waterbody-specific basis as needed to protect aquatic life and human health and other existing and designated uses and to increase the technical accuracy of the criteria being applied. The Department shall formally adopt any revised criteria following public review and comment.

(5) In aquatic habitats where more than one designated use exists, the most stringent use standards will apply.

4. SITE-SPECIFIC CRITERIA

(1) The Tribe may revise criteria on reservation TAS waters as needed to protect aquatic life and human health and other existing and designated uses to increase the technical accuracy of the criteria being applied.

(2) The Department will, in its discretion, establish a site-specific water quality criterion that modifies a water quality criterion set out in Section 7 or 19, in regulation, as described in (3) and (4) of this section.

(3) Whenever the natural condition of the surface reservation TAS waters are demonstrated to be of lower quality than the criteria assigned, the Tribe may determine that the natural conditions shall constitute the water quality criteria,

> (a) If the natural condition varies with time, the natural condition will be determined as the natural condition measured during an annual, seasonal, or shorter period of time prior to human caused influence.
> (b) The Tribe may, at its discretion determine a natural condition for one or more seasonal or shorter time period to reflect variable ambient conditions.
> (c) Historical data or data from an appropriate reference site, that represents natural condition may be used to determine the criterion.

(4) Upon application, or on its own initiative, the Department will, in its discretion, set site-specific criteria if the Department finds that the evidence reasonably demonstrates that the site-specific criterion fully protects designated uses in section 18 and that:

> (a) for reasons specific to a certain site, a criterion in Section 7 or Section 19 is more stringent or less stringent than necessary to ensure full protection of the corresponding use class; or
> (b) a criterion would be better expressed in terms different from those in Section 7 or Section 19.
> (c) The species or habitats present, or expected to be present under natural conditions, are more sensitive or less sensitive to a substance than indicated by the criterion, and a site-specific criterion is required to prevent adverse effects or to alleviate unnecessarily restrictive general criterion; or
> (d) the natural characteristics of the receiving environment would increase or reduce the biological availability or the toxicity of a substance, or otherwise alter the substance, and a site-specific criterion is required to prevent adverse effects or to alleviate an unnecessarily restrictive general criterion.

(5) An applicant seeking a site-specific criterion under this section shall provide all information that the Department determines is necessary to modify an existing criterion. The Department will, in a timely manner, request and review for completeness, information submitted under this subsection. In all cases, the burden of proof is on the applicant seeking a site-specific criterion.

(6) Any modifications to the criteria in Section 7 or Section 19 will be adopted in regulation.

(7) The Tribe shall formally adopt any revised criteria following public review and comment.

(8) Revised criteria will be submitted to EPA, after adoption by the Tribe, for review along with any information that will aid EPA to determine the adequacy of the scientific basis of the revised criterion.

5. NARRATIVE CRITERIA

All Reservation TAS Waters, including those within designated mixing zones, shall be free from substances attributable to point source discharges, non-point sources, or instream activities in accordance with the following:

(1) Floating Solids, Oil and Grease: All waters shall be free from visible oils, scum, foam, grease, and other floating materials and suspended substances of a persistent nature resulting from anthropogenic causes.

(2) Color: True color-producing materials resulting from anthropogenic causes shall not create an aesthetically undesirable condition; nor should color inhibit photosynthesis or otherwise impair the existing and designated uses of the water.

(3) Odor and Taste: Water contaminants from anthropogenic causes shall be limited to concentrations that will not impart unpalatable flavor to fish, or result in offensive odor or taste arising from the water, or otherwise interfere with the existing and designated uses of the water.

(4) Nuisance Conditions: Nutrients or other substances from anthropogenic causes shall not be present in concentrations which will produce objectionable algal densities or nuisance aquatic vegetation, result in a dominance of nuisance species, or otherwise cause nuisance conditions.

(5) Turbidity: Turbidity shall not be at a level to impair designated uses or aquatic biota.

(6) Bottom Deposits: All Reservation TAS Waters shall be free from anthropogenic contaminants that may settle and have a deleterious effect on the aquatic biota or that will significantly alter the physical and chemical properties of the water or the bottom sediments.

6. ANTIDEGRADATION POLICY

(1) Existing uses and the level of water quality necessary to protect the existing uses shall be maintained and protected. Where designated uses of the water body are impaired, there shall be no measurable lowering of water quality with respect to the pollutant or pollutants which are causing or contributing to the impairment.

(2) Where the quality of the waters exceeds levels necessary to support propagation of fish and wildlife and recreation in and on the water, that quality shall be maintained and protected unless the Tribe finds, after the Tribe's intergovernmental coordination and public participation provisions have been met, that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located. In allowing such degradation or lowering of water quality, the Tribe shall assure the degradation will continue to fully protect existing uses and will not adversely affect threatened and endangered species or public health as determined by the Department. Further, the Tribe shall assure that there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective, and reasonable best management practices for nonpoint source control.

(3) Outstanding resource waters. Waters meeting one or more of the following criteria shall be considered for outstanding resource water designation:

- (a) Outstanding national or tribal resource;
- (b) Documented critical habitat for populations of threatened or endangered species;
- (c) Waters of exceptional recreational, ceremonial, cultural, or ecological significance; or
- (d) Waters supporting priority species as determined by the Tribe.

(4) Where waters constitute an outstanding resource water, the water quality and uses shall be maintained and protected and pollutants that will reduce the existing quality thereof shall not be allowed to enter such waters. To accomplish this the Department may require water quality controls, maintenance of natural flow regimes, protection of instream habitats, and pursuit of land use practices protective of the watershed.

(5) In those cases where potential water quality impairments associated with thermal discharge are involved, the Antidegradation Policy and implementing methods shall be consistent with Section 316 of the Clean Water Act, as amended.

7. TOXIC SUBSTANCES

(1) Toxic substances shall not be introduced into Reservation TAS Waters in concentrations which have the potential either singularly or cumulatively to adversely affect existing and designated water uses, cause acute or chronic toxicity to the most sensitive biota dependent upon those waters, or adversely affect public health, as determined by the Department, except as allowed for under Mixing Zones.

(2) The Department shall employ or require chemical testing, acute and/or chronic toxicity testing, and biological assessments, as appropriate, to evaluate compliance with subsection (1) of this section. Where necessary the Department shall establish controls to ensure that aquatic communities and the existing and designated beneficial uses of waters are being fully protected.

(3) Criteria for toxic, and other substances not listed shall be determined with consideration of *USEPA Quality Criteria for Water* found at, EPA-822-H-04-001 December 2004 and other relevant information as appropriate.

(4) Risk-based criteria for carcinogenic substances shall be applied such that the upper-bound excess cancer risk is less than or equal to one in one million, which means the probability of one excess cancer per one million people exposed.

(5) The aquatic organism consumption rate utilized in determining the human health criteria shall be EPA's current recommended rate of 17.5 g/day as provided in 63 F.R. 43756.

(6) Criteria for metals shall be applied as dissolved values. Except lead which is represented as total recoverable.

(7) The criteria in the following table shall be applied to all Reservation TAS Waters for the protection of aquatic life and human health.

(8) Criteria Maximum Concentration and Criterion Continuous Concentration
The Criteria Maximum Concentration (CMC) is an estimate of the highest concentration of a material in surface water to which an aquatic community can be exposed briefly without resulting in an unacceptable effect. The Criterion Continuous Concentration (CCC) is an estimate of the highest concentration of a material in surface water to which an aquatic community can be exposed indefinitely without resulting in an unacceptable effect. The CMC and CCC are just two of the six parts of an aquatic life criterion; the other four parts are the acute averaging period, chronic averaging period, acute frequency of allowed exceedence, and chronic frequency of allowed exceedence. Because 304(a) aquatic life criteria are national guidance, they are intended to be protective of the vast majority of the aquatic communities in the United States.

(9) Contaminants Without Numeric Criteria (Blanks)
EPA has not calculated criteria for contaminants with blanks. However, permit authorities should address these contaminants in NPDES permit actions using the Tribe's existing narrative criteria for toxics.

WATER QUALITY CRITERIA FOR TOXIC POLLUTANTS

The concentration for each compound listed in this table is a criterion for aquatic life or human health protection. Selecting values for regulatory purposes will depend on the most sensitive beneficial use to be protected and the level of protection necessary for aquatic life and human health as specified within this table. All concentrations, except asbestos, are micrograms per liter (µg/L). All values are expressed as dissolved except lead and selenium which are expressed as total recoverable.

Numeric Criteria for Toxic Substances for TAS waters designated for Aquatic Life, Recreation and Cultural or Domestic Water Supply Use.

a. Columns A1, A2, and B2 of the following table apply to TAS waters designated for aquatic life use.
b. Column B2 of the following table applies to TAS waters designated for recreation and cultural use.
c. Column B1 of the following table applies to TAS waters designated for domestic water supply use

					Human Health For Consumption of:		
Priority Pollutant		**CAS Number**	**CMC (µg/L)** **A1**	**CCC (µg/L)** **A2**	**Water + Organism (µg/L)** **B1**	**Organism Only (µg/L)** **B2**	**FR Cite/ Source**
1	Ammonia	7664417	FRESHWATER CRITERIA ARE pH, Temperature and Life-stage DEPENDENT – see section 12 of this chapter				EPA822-R-99-014
2	Antimony	7440360			5.6 B	640 B	65FR66443
3	Arsenic	7440382	340 A,D,K	150 A,D,K	0.018 C,M,S	0.14 C,M,S	65FR31682 57FR60848
4	Beryllium	7440417			Z		65FR31682
5	Cadmium	7440439	2.13D,E,K,bb	0.1.03 D,E,K,bb	Z		EPA-822-R-01-001 65FR31682
6	Chlorine	7782505	19	11			Gold Book
7	Chromium (III)	16065831	570 D,E,K	74 D,E,K	Z Total		EPA820/B-96-001 65FR31682
8	Chromium (VI)	18540299	16 D,K	11 D,K	Z Total		65FR31682
9	Copper	7440508	13 D,E,K,cc	9.0 D,E,K,cc	1,300 U		65FR31682

					Human Health For Consumption of:		
Priority Pollutant		CAS Number	CMC (µg/L) A1	CCC (µg/L) A2	Water + Organism (µg/L) B1	Organism Only (µg/L) B2	FR Cite/ Source
10	Lead	7439921	82 E	3.2 E			65FR31682
11	Mercury	7439976	1.4 D,K,hh	0.012	0.05	0.051	57FR60848 62FR42160 65FR31682
12	Nickel	7440020	470 D,E,K	52 D,E,K	610 B	4,600 B	65FR31682
13	Selenium	7782492		5.0 T	170 Z	4200	65FR31682 65FR66443
14	Silver	7440224	3.2 D,E,G				65FR31682
15	Thallium	7440280			0.24	0.47	68FR75510
16	Zinc	7440666	120 D,E,K	120 D,E,K	7,400 U	26,000 U	65FR31682 65FR66443
17	Cyanide	57125	22 K,Q	5.2 K,Q	140 jj	140 jj	EPA820/B-96-001 57FR60848 68FR75510
18	Asbestos	1332214			7 million fibers/L I		57FR60848
19	2,3,7,8-TCDD (Dioxin)	1746016			5.0E-9 C	5.1E-9 C	65FR66443
20	Acrolein	107028			190	290	65FR66443
21	Acrylonitrile	107131			0.051 B,C	0.25 B,C	65FR66443
22	Benzene	71432			2.2 B,C	51 B,C	IRIS

					Human Health For Consumption of:		
Priority Pollutant		CAS Number	CMC (µg/L) A1	CCC (µg/L) A2	Water + Organism (µg/L) B1	Organism Only (µg/L) B2	FR Cite/ Source
							01/19/00 &65FR66443
23	Bromoform	75252			4.3 B,C	140 B,C	65FR66443
24	Carbon Tetrachloride	56235			0.23 B,C	1.6 B,C	65FR66443
25	Chlorobenzene	108907			130 Z,U,	1,600 U	68FR75510
26	Chlorodibromomethane	124481			0.40 B,C	13 B,C	65FR66443
27	Chloroethane	75003					
28	2-Chloroethylvinyl Ether	110758					
29	Chloroform	67663			5.7 C,P	470 C,P	62FR42160
30	Dichlorobromomethane	75274			0.55 B,C	17 B,C	65FR66443
31	1,1-Dichloroethane	75343					
32	1,2-Dichloroethane	107062			0.38 B,C	37 B,C	65FR66443
33	1,1-Dichloroethylene	75354			330	7,100	68FR75510
34	1,2-Dichloropropane	78875			0.50 B,C	15 B,C	65FR66443
35	1,3-Dichloropropene	542756			0.34 c	21 c	68FR75510
36	Ethylbenzene	100414			530	2,100	68FR75510
37	Methyl Bromide	74839			47 B	1,500 B	65FR66443
38	Methyl Chloride	74873					65FR31682
39	Methylene Chloride	75092			4.6 B,C	590 B,C	65FR66443

					Human Health For Consumption of:		
Priority Pollutant		CAS Number	CMC (μg/L) A1	CCC (μg/L) A2	Water + Organism (μg/L) B1	Organism Only (μg/L) B2	FR Cite/ Source
40	1,1,2,2-Tetrachloroethane	79345			0.17 B,C	4.0 B,C	65FR66443
41	Tetrachloroethylene	127184			0.69 C	3.3 C	65FR66443
42	Toluene	108883			1,300 Z	15,000	68FR75510
43	1,2-Trans-Dichloroethylene	156605			140 Z	10,000	68FR75510
44	1,1,1-Trichloroethane	71556			Z		65FR31682
45	1,1,2-Trichloroethane	79005			0.59 B,C	16 B,C	65FR66443
46	Trichloroethylene	79016			2.5 C	30 C	65FR66443
47	Vinyl Chloride	75014			0.025 C,kk	2.4 C,kk	68FR75510
48	2-Chlorophenol	95578			81 B,U	150 B,U	65FR66443
49	2,4-Dichlorophenol	120832			77 B,U	290 B,U	65FR66443
50	2,4-Dimethylphenol	105679			380 B	850 B,U	65FR66443
51	2-Methyl-4,6-Dinitrophenol	534521			13	280	65FR66443
52	2,4-Dinitrophenol	51285			69 B	5,300 B	65FR66443
53	2-Nitrophenol	88755					
54	4-Nitrophenol	100027					
55	3-Methyl-4-Chlorophenol	59507			U	U	

					Human Health For Consumption of:		
Priority Pollutant		CAS Number	CMC (µg/L) A1	CCC (µg/L) A2	Water + Organism (µg/L) B1	Organism Only (µg/L) B2	FR Cite/ Source
56	Pentachlorophenol	87865	19 F,K	15 F,K	0.27 B,C	3.0 B,C,H	65FR31682 65FR66443
57	Phenol	108952			21,000 B,U	1,700,000 B,U	65FR66443
58	2,4,6-Trichlorophenol	88062			1.4 B,C	2.4 B,C,U	65FR66443
59	Acenaphthene	83329			670 B,U	990 B,U	65FR66443
60	Acenaphthylene	208968					
61	Anthracene	120127			8,300 B	40,000 B	65FR66443
62	Benzidine	92875			0.000086 B,C	0.00020 B,C	65FR66443
63	Benzo(a)Anthracene	56553			0.0038 B,C	0.018 B,C	65FR66443
64	Benzo(a)Pyrene	50328			0.0038 B,C	0.018 B,C	65FR66443
65	Benzo(b)Fluoranthene	205992			0.0038 B,C	0.018 B,C	65FR66443
66	Benzo(ghi)Perylene	191242					
67	Benzo(k)Fluoranthene	207089			0.0038 B,C	0.018 B,C	65FR66443
68	Bis(2-Chloroethoxy)Methane	111911					
69	Bis(2-Chloroethyl)Ether	111444			0.030 B,C	0.53 B,C	65FR66443

					Human Health For Consumption of:		
	Priority Pollutant	**CAS Number**	**CMC (µg/L) A1**	**CCC (µg/L) A2**	**Water + Organism (µg/L) B1**	**Organism Only (µg/L) B2**	**FR Cite/ Source**
70	Bis(2-Chloroisopropyl)Ether	108601			1,400 B	65,000 B	65FR66443
71	Bis(2-Ethylhexyl)Phthalate[X]	117817			1.2 B,C	2.2 B,C	65FR66443
72	4-Bromophenyl Phenyl Ether	101553					
73	Butylbenzyl Phthalate[W]	85687			1,500 B	1,900 B	65FR66443
74	2-Chloronaphthalene	91587			1,000 B	1,600 B	65FR66443
75	4-Chlorophenyl Phenyl Ether	7005723					
76	Chrysene	218019			0.0038 B,C	0.018 B,C	65FR66443
77	Dibenzo(a,h)Anthracene	53703			0.0038 B,C	0.018 B,C	65FR66443
78	1,2-Dichlorobenzene	95501			420	1,300	68FR75510
79	1,3-Dichlorobenzene	541731			320	960	65FR66443
80	1,4-Dichlorobenzene	106467			63	190	68FR75510
81	3,3'-Dichlorobenzidine	91941			0.021 B,C	0.028 B,C	65FR66443
82	Diethyl Phthalate[W]	84662			17,000 B	44,000 B	65FR66443
83	Dimethyl Phthalate[W]	131113			270,000	1,100,000	65FR66443
84	Di-n-Butyl Phthalate[W]	84742			2,000 B	4,500 B	65FR66443

					Human Health For Consumption of:		
Priority Pollutant		**CAS Number**	**CMC (µg/L) A1**	**CCC (µg/L) A2**	**Water + Organism (µg/L) B1**	**Organism Only (µg/L) B2**	**FR Cite/ Source**
85	2,4-Dinitrotoluene	121142			0.11 C	3.4 C	65FR66443
86	2,6-Dinitrotoluene	606202					
87	Di-n-Octyl Phthalate	117840					
88	1,2-Diphenylhydrazine	122667			0.036 B,C	0.20 B,C	65FR66443
89	Fluoranthene	206440			130 B	140 B	65FR66443
90	Fluorene	86737			1,100 B	5,300 B	65FR66443
91	Hexachlorobenzene	118741			0.00028 B,C	0.00029 B,C	65FR66443
92	Hexachlorobutadiene	87683			0.44 B,C	18 B,C	65FR66443
93	Hexachlorocyclopentadiene	77474			40 U	1,100 U	68FR75510
94	Hexachloroethane	67721			1.4 B,C	3.3 B,C	65FR66443
95	Ideno(1,2,3-cd)Pyrene	193395			0.0038 B,C	0.018 B,C	65FR66443
96	Isophorone	78591			35 B,C	960 B,C	65FR66443
97	Naphthalene	91203					
98	Nitrobenzene	98953			17 B	690 B,H,U	65FR66443
99	N-Nitrosodimethylamine	62759			0.00069 B,C	3.0 B,C	65FR66443
100	N-Nitrosodi-n-	621647			0.0050	0.51 B,C	65FR66443

					Human Health For Consumption of:		
Priority Pollutant		**CAS Number**	**CMC (µg/L) A1**	**CCC (µg/L) A2**	**Water + Organism (µg/L) B1**	**Organism Only (µg/L) B2**	**FR Cite/ Source**
	Propylamine				B,C		
101	N-Nitrosodiphenylamine	86306			3.3 B,C	6.0 B,C	65FR66443
102	Phenanthrene	85018					
103	Pyrene	129000			830 B	4,000 B	65FR66443
104	1,2,4-Trichlorobenzene	120821			35	70	68FR75510
105	Aldrin	309002	3.0 G		0.000049 B,C	0.000050 B,C	65FR31682 65FR66443
106	alpha-BHC	319846			0.0026 B,C	0.0049 B,C	65FR66443
107	beta-BHC	319857			0.0091 B,C	0.017 B,C	65FR66443
108	gamma-BHC (Lindane)	58899	0.95 K		0.98	1.8	65FR31682 68FR75510
109	delta-BHC	319868					
110	Chlordane	57749	2.4 G	0.0043 G,aa	0.00080 B,C	0.00081 B,C	65FR31682 65FR66443
111	4,4'-DDT	50293	1.1 G,ii	0.001 G,aa,ii	0.00022 B,C	0.00022 B,C	65FR31682 65FR66443
112	4,4'-DDE	72559			0.00022 B,C	0.00022 B,C	65FR66443

					Human Health For Consumption of:		
Priority Pollutant		CAS Number	CMC (µg/L) A1	CCC (µg/L) A2	Water + Organism (µg/L) B1	Organism Only (µg/L) B2	FR Cite/ Source
113	4,4'-DDD	72548			0.00031 B,C	0.00031 B,C	65FR66443
114	Dieldrin	60571	0.24 K	0.056 K,O	0.000052 B,C	0.000054 B,C	65FR31682 65FR66443
115	alpha-Endosulfan	959988	0.22 G,Y	0.056 G,Y	62 B	89 B	65FR31682 65FR66443
116	beta-Endosulfan	33213659	0.22 G,Y	0.056 G,Y	62 B	89 B	65FR31682 65FR66443
117	Endosulfan Sulfate	1031078			62 B	89 B	65FR66443
118	Endrin	72208	0.086 K	0.036 K,O	0.059	0.060	65FR31682 68FR75510
119	Endrin Aldehyde	7421934			0.29 B	0.30 B,H	65FR66443
120	Heptachlor	76448	0.52 G	0.0038 G,aa	0.000079 B,C	0.000079 B,C	65FR31682 65FR66443
121	Heptachlor Epoxide	1024573	0.52 G,V	0.0038 G,V,aa	0.000039 B,C	0.000039 B,C	65FR31682 65FR66443
122	Polychlorinated Biphenyls PCBs:			0.014 N,aa	0.000064 B,C,N	0.000064 B,C,N	65FR31682 65FR66443
123	Toxaphene	8001352	0.73	0.0002 aa	0.00028B,C	0.00028 B,C	65FR31682 65FR66443

Note: The values for dissolved metals that are shown on this table are calculated using a hardness of 100.

Footnotes:

A This recommended water quality criterion was derived from data for arsenic (III), but is applied here to total arsenic, which might imply that arsenic (III) and arsenic (V) are equally toxic to aquatic life and that their toxicities are additive. In the arsenic criteria document (EPA 440/5-84-033, January 1985), Species Mean Acute Values are given for both arsenic (III) and arsenic (V) for five species and the ratios of the SMAVs for each species range from 0.6 to 1.7. Chronic values are available for both arsenic (III) and arsenic (V) for one species; for the fathead minnow, the chronic value for arsenic (V) is 0.29 times the chronic value for arsenic (III). No data are known to be available concerning whether the toxicities of the forms of arsenic to aquatic organisms are additive.

B This criterion has been revised to reflect The Environmental Protection Agency's q1* or RfD, as contained in the Integrated Risk Information System (IRIS) as of May 17, 2002. The fish tissue bioconcentration factor (BCF) from the 1980 Ambient Water Quality Criteria document was retained in each case.

C This criterion is based on carcinogenicity of 10^{-6} risk. Alternate risk levels may be obtained by moving the decimal point (e.g., for a risk level of 10^{-5}, move the decimal point in the recommended criterion one place to the right).

D Freshwater and saltwater criteria for metals are expressed in terms of the dissolved metal in the water column. The recommended water quality criteria value was calculated by using the previous 304(a) aquatic life criteria expressed in terms of total recoverable metal, and multiplying it by a conversion factor (CF). The term "Conversion Factor" (CF) represents the recommended conversion factor for converting a metal criterion expressed as the total recoverable fraction in the water column to a criterion expressed as the dissolved fraction in the water column See "Office of Water Policy and Technical Guidance on Interpretation and Implementation of Aquatic Life Metals Criteria", October 1, 1993, by Martha G. Prothro, Acting Assistant Administrator for Water, available from the Water Resource center, USEPA, 401 M St., SW, mail code RC4100, Washington, DC 20460; and 40CFR131.36(b)(1). Conversion Factors applied in the table can be found in section 11 of this chapter.

E The freshwater criterion for this metal is expressed as a function of hardness (mg/L) in the water column. The value given here corresponds to a hardness of 100 mg/L. Criteria values for other hardness may be calculated from the following: CMC (dissolved) = $\exp\{m_A [\ln(\text{hardness})] + b_A\}$ (CF), or CCC (dissolved) = $\exp\{m_C [\ln(\text{hardness})] + b_C\}$ (CF) and the parameters specified in section 11 of this chapter - Parameters for Calculating Freshwater Dissolved Metals Criteria That Are Hardness-Dependent. Lead is expressed at Total Lead using the equation CMC (dissolved) = $\exp\{m_A [\ln(\text{hardness})] + b_A\}$, or CCC (dissolved) = $\exp\{m_C [\ln(\text{hardness})] + b_C\}$ and the parameters specified in section 11 of this chapter. Hardness is based on the ambient values found at the time of sampling; no low end hardness cap is used.

F Freshwater aquatic life values for pentachlorophenol are expressed as a function of pH, and are calculated as follows: CMC = exp(1.005(pH)-4.869); CCC = exp(1.005(pH)-5.134). Values displayed in table correspond to a pH of 7.8.

G This Criterion is based on 304(a) aquatic life criterion issued in 1980, and was issued in one of the following documents: Aldrin/Dieldrin (EPA 440/5-80-019), Chlordane (EPA 440/5-80-027), DDT (EPA 440/5-80-038), Endosulfan (EPA 440/5-80-046), Endrin (EPA 440/5-80-047), Heptachlor (EPA 440/5-80-052), Hexachlorocyclohexane (EPA 440/5-80-054), Silver (EPA 440/5-80-071). The Minimum Data Requirements and derivation procedures were different in the 1980 Guidelines than in the 1985 Guidelines. For example, a "CMC" derived using the 1980 Guidelines was derived to be used as an instantaneous maximum. If assessment is to be done using an averaging period, the values given should be divided by 2 to obtain a value that is more comparable to a CMC derived using the 1985 Guidelines.

H No criterion for protection of human health from consumption of aquatic organisms excluding water was presented in the 1980 criteria document or in the *1986 Quality Criteria for Water*. Nevertheless, sufficient information was presented in the 1980 document to allow the calculation of a criterion, even though the results of such a calculation were not shown in the document.

I This criterion for asbestos is the Maximum Contaminant Level (MCL) developed under the Safe Drinking Water Act (SDWA).

J This letter not used as a footnote.

K This recommended criterion is based on a 304(a) aquatic life criterion that was issued in the *1995 Updates: Water Quality Criteria Documents for the Protection of Aquatic Life in Ambient Water*, (EPA-820-B-96-001, September 1996). This value was derived using the GLI Guidelines (60FR15393-15399, March 23, 1995; 40CFR132 Appendix A); the difference between the 1985 Guidelines and the GLI Guidelines are explained on page iv of the 1995 Updates.

L The CMC = 1/[(f1/CMC1) + (f2/CMC2)] where f1 and f2 are the fractions of total selenium that are treated as selenite and selenate, respectively, and CMC1 and CMC2 are 185.9 μg/l and 12.82 μg/l, respectively.

M EPA is currently reassessing the criteria for arsenic.

N This criterion applies to total pcbs, (e.g., the sum of all congener or all isomer or homolog or Aroclor analyses.)

O The derivation of the CCC for this pollutant (Endrin) did not consider exposure through the diet, which is probably important for aquatic life occupying upper trophic levels.

P Although a new RfD is available in IRIS, the surface water criteria will not be revised until the National Primary Drinking Water Regulations: Stage 2 Disinfectants and Disinfection Byproducts Rule (Stage 2 DBPR) is completed, since public comment on the relative source contribution (RSC) for chloroform is anticipated.

Q This recommended water quality criterion is expressed as weak acid dissociable μg free cyanide (as CN)/L.

R This value for selenium was announced (61FR58444-58449, November 14, 1996) as a proposed GLI 303(c) aquatic life criterion. EPA is currently working on this criterion and so this value might change substantially in the near future.

S This recommended water quality criterion for arsenic refers to the inorganic form only.

T This recommended water quality criterion for selenium is expressed in terms of total recoverable metal in the water column. It is scientifically acceptable to use the conversion factor (0.996- CMC or 0.922- CCC) that was used in the GLI to convert this to a value that is expressed in terms of dissolved metal.

U The organoleptic effect criterion is more stringent than the value for priority toxic pollutants.

V This value was derived from data for heptachlor and the criteria document provides insufficient data to estimate the relative toxicities of heptachlor and heptachlor epoxide.

W Although EPA has not published a completed criteria document for butylbenzyl phthalate it is EPA=s understanding that sufficient data exist to allow calculation of aquatic criteria. It is anticipated that industry intends to publish in the peer reviewed literature draft aquatic life criteria generated in accordance with EPA Guidelines. EPA will review such criteria for possible issuance as national WQC.

X There is a full set of aquatic life toxicity data that show that DEHP is not toxic to aquatic organisms at or below its solubility limit.

Y This value was derived from data for endosulfan and is most appropriately applied to the sum of alpha-endosulfan and beta-endosulfan.

Z A more stringent MCL has been issued by EPA. Refer to drinking water regulations (40 CFR 141) or Safe Drinking Water Hotline (1-800-426-4791) for values.

aa This criterion is based on a 304(a) aquatic life criterion issued in 1980 or 1986, and was issued in one of the following documents: Aldrin/Dieldrin (EPA 440/5-80-019), Chlordane (EPA 440/5-80-027), DDT (EPA 440/5-80-038), Endrin (EPA 440/5-80-047), Heptachlor (EPA 440/5-80-052), Polychlorinated biphenyls (EPA 440/5-80-068), Toxaphene (EPA 440/5-86-006). This CCC is currently based on the Final Residue Value (FRV) procedure. Since the publication of the Great Lakes Aquatic Life Criteria Guidelines in 1995 (60FR15393-15399, March 23, 1995), the Agency no longer uses the Final Residue Value procedure for deriving CCCs for new or revised 304(a) aquatic life criteria. Therefore, the Agency anticipates that future revisions of this CCC will not be based on the FRV procedure.

bb This water quality criterion is based on a 304(a) aquatic life criterion that was derived using the 1985 Guidelines (*Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses*, PB85-227049, January 1985) and was issued in one of the following criteria documents: Arsenic (EPA 440/5-84-033), Cadmium (EPA-822-R-01-001), Chromium (EPA 440/5-84-029), Copper (EPA 440/5-84-031), Cyanide (EPA 440/5- 84-028), Lead (EPA 440/5-84-027), Nickel (EPA 440/5-86-004), Pentachlorophenol (EPA 440/5-86-009), Toxaphene, (EPA 440/5-86-006), Zinc (EPA 440/5-87- 003).

cc When the concentration of dissolved organic carbon is elevated, copper is substantially less toxic and use of Water-Effect Ratios might be appropriate.

dd This letter not used as a footnote.

ee This letter not used as a footnote.

ff This letter not used as a footnote.

gg EPA is actively working on this criterion and so this recommended water quality criterion may change substantially in the near future.

hh if the CCC for mercury exceeds 0.012 ug/l more than once in a 3-year period in the ambient water, the edible portion of aquatic species of concern must be analyzed to determine whether the concentration of methylmercury exceeds the FDA action level.

ii This criterion applies to DDT and its metabolites (i.e., the total concentration of DDT and its metabolites should not exceed this value).

jj This recommended water quality criterion is expressed as total cyanide, even though the IRIS RFD we used to derive the criterion is based on free cyanide. The multiple forms of cyanide that are present in ambient water have significant differences in toxicity due to their differing abilities to liberate the CN-moiety. Some complex cyanides require even more extreme conditions than refluxing with sulfuric acid to liberate the CN-moiety. Thus, these complex cyanides are expected to have little or no 'bioavailability' to humans. If a substantial fraction of the cyanide present in a water body is present in a complexed form (e.g., $Fe_4[Fe(CN)_6]_3$), this criterion may be over conservative.

kk This recommended water quality criterion was derived using the cancer slope factor of 1.4 (LMS exposure from birth).

(11) Calculation of Dissolved Metals Criteria

The 304(a) criteria for metals, shown as dissolved metals, are calculated in one of two ways. For freshwater metals criteria that are hardness-dependent, the dissolved metal criteria were calculated using a hardness of 100 mg/l as $CaCO_3$ for illustrative purposes only. Freshwater metals' criteria that are not hardness-dependent are calculated by multiplying the total recoverable criteria before rounding by the appropriate conversion factors. The final dissolved metals' criteria in the table are rounded to two significant figures. Information regarding the calculation of hardness dependent conversion factors are included in the footnotes. Actual hardness values found at the time of sampling shall be used in hardness-dependant calculations. High end hardness is capped at 400mg/L and is not capped at the low end.

Conversion Factors for Dissolved Metals

Metal	Conversion Factor freshwater CMC	Conversion Factor freshwater CCC
Arsenic	1.000	1.000
Cadmium	1.136672-[(ln hardness)(0.041838)]	1.101672-[(ln hardness)(0.041838)]
Chromium III	0.316	0.860
Chromium VI	0.982	0.962
Copper	0.960	0.960
Mercury	0.85	0.85
Nickel	0.998	0.997
Selenium	--	--
Silver	0.85	--
Zinc	0.978	0.986

Parameters for Calculating Freshwater Dissolved Metals Criteria That Are Hardness-Dependent

Chemical	m_A	b_A	m_C	b_C	Freshwater Conversion Factors (CF)	
					CMC	CCC
Cadmium	1.0166	-3.924	0.7409	-4.719	1.136672-[(ln hardness)(0.041838)]	1.101672-[(ln hardness)(0.041838)]
Chromium III	0.8190	3.7256	0.8190	0.6848	0.316	0.860
Copper	0.9422	-1.700	0.8545	-1.702	0.960	0.960

Chemical	m_A	b_A	m_C	b_C	Freshwater Conversion Factors (CF)	
					CMC	CCC
Lead (Total)	1.273	-1.460	1.273	-4.705		
Nickel	0.8460	2.255	0.8460	0.0584	0.998	0.997
Silver	1.72	-6.59	--	--	0.85	--
Zinc	0.8473	0.884	0.8473	0.884	0.978	0.986

Hardness-dependant metals= criteria may be calculated from the following:
CMC (dissolved) = $\exp\{m_A [\ln(\text{hardness})]+ b_A\}$ (CF); CCC (dissolved) = $\exp\{m_C [\ln(\text{hardness})]+ b_C\}$ (CF)
Total Lead: CMC = $\exp\{m_A [\ln(\text{hardness})]+ b_A\}$; CCC = $\exp\{m_C [\ln(\text{hardness})]+ b_C\}$

(12) Calculation of Freshwater Ammonia Criterion

(a). The one-hour average concentration of total ammonia nitrogen (in mg N/L) does not exceed, more than once every three years on the average, the CMC (acute criterion) calculated using the following equations.

$$\text{CMC} = \frac{0.275}{1 + 10^{7.204-\text{pH}}} + \frac{39.0}{1 + 10^{\text{pH}-7.204}}$$

(b) The thirty-day average concentration of total ammonia nitrogen (in mg N/L) does not exceed, more than once every three years on the average, the CCC (chronic criterion) calculated using the following equations.

When fish early life stages are absent:

$$CCC = \left(\frac{0.0577}{1 + 10^{7.688-pH}} + \frac{2.487}{1 + 10^{pH-7.688}} \right) \; X \; 1.45 \cong 10^{0.028 \cong (25-MAX\ (T,7))}$$

(c) In addition, the highest four-day average within the 30-day period should not exceed 2.5 times the CCC.

8. RADIOACTIVE SUBSTANCES

(1) Radioisotope concentrations in all Reservation TAS Waters shall not exceed concentrations which result in a significant hazard to humans

(2) For the protection of human health concentrations of radioactive materials for all Reservation TAS Waters shall not exceed the following:
(a) Gross Alpha Particle Activity - 15 pCi/L
(b) Gross Beta Particle Activity - 50 pCi/L
(c) Tritium - 20,000 pCi/L
(d) Strontium 90 - 8 pCi/L
(e) Radium 226/Radium 228 - 3 pCi/L

9. BIOLOGICAL CRITERIA

(1) Reservation TAS Waters shall be of sufficient quality to support aquatic biota without detrimental changes in the resident aquatic communities.

(2) Reservation TAS Waters shall be free from substances, whether attributable to point source discharges, nonpoint sources, or instream activities, in concentrations or combinations which would impair the structure or limit the function of the resident aquatic community as it naturally occurs.

(3) The structure and function of the aquatic community shall be measured by biological assessment methods approved by the Department.

(4) Determination of impairment or limitation of the resident aquatic community shall be based on a comparison with the aquatic community found at an appropriate reference site or region.

10. WILDLIFE CRITERIA

Reservation TAS Waters shall be of sufficient quality to protect and support all life stages of resident and/or migratory wildlife species which live in, on, or drink from Reservation TAS Waters.

11. WETLANDS

(1) All wetlands which are considered Reservation TAS Waters, and which are not constructed wetlands, shall be subject to the Narrative Criteria (section 5), Antidegradation (section 6), and Narrative Toxic Substances Criterion (section 7(1)) provisions within this chapter.

(2) Water quality in wetlands which are considered Reservation TAS Waters shall be maintained at naturally occurring levels, within the natural range of variation for the individual wetland.

(3) Physical and biological characteristics shall be maintained and protected by:
(a) Maintaining hydrological conditions, including hydroperiod, hydrodynamics, and natural water temperature variations;
(b) Maintaining the natural hydrophytic vegetation; and
(c) Maintaining substrate characteristics necessary to support existing and designated uses.

(4) Wetlands shall not be used in lieu of stormwater treatment, except as specified by number 7, below. Stormwater shall be treated before discharge to a wetland.

(5) Point and nonpoint sources of pollution shall not cause destruction or impairment of wetlands except where authorized under section 404 of the CWA.

(6) Wetlands shall not be used as repositories or treatment systems for wastes from human sources, except as specified by number 7, below.

(7) Wetlands intentionally created from non-wetland sites for the sole purpose of wastewater or stormwater treatment (constructed wetlands) are not considered "Reservation TAS Waters" and are not subject to the provisions of this section.

12. MIXING ZONES

(1) General Conditions

(a) The Department may allow a designated portion of a receiving water to serve as a zone of dilution for wastewaters and receiving waters to mix thoroughly and this zone will be defined as a mixing zone.

(b) Mixing zones may be granted for whole effluent or on a pollutant by pollutant basis.

(c) The allowable size, shape, and location of a mixing zone shall be established in certifications under Section 401 of the CWA, or orders, as appropriate. In determining the location, surface area, and volume of a mixing zone, the Department or EPA may use appropriate mixing zone guidelines (such as EPA /505/2-90-001) to assess the biological, physical, and chemical character of receiving waters, and effluent, and the most appropriate placement of the outfall, to protect instream water quality, public health, and other designated uses.

(d) The Department may, as necessary, require mixing zone monitoring studies and/or bioassays and biosurveys as appropriate to be conducted to evaluate water quality or biological status within and outside of the mixing zone boundary.

(e) The Department may require revision, revocation or denial of permits authorizing mixing zones upon expiration of the permit, or prior to expiration if information suggests that the nature and impacts of the mixing zone are different than the conditions used to determine mixing zone criteria.

(f) No mixing zone shall be granted unless the supporting information clearly indicates the mixing zone would not have a reasonable potential to cause a loss of or impair recovery of aquatic life, wildlife, or sensitive or important habitat; create a barrier to migration of species; or substantially interfere with the existing or designated uses of the water body as a whole; result in damage to the ecosystem; or adversely affect threatened and endangered species or public health as determined by the Department.

(g) No Mixing zone shall be granted unless the supporting information clearly indicates that it would not cause lethality to organisms passing through the mixing zone.

(h) Mixing zones will not be granted for discharges to outstanding resource waters, wetlands, or ephemeral or intermittent streams.

(i) In TAS waters having a mean detention time greater than 15 days, mixing zones shall not be allowed unless it can be demonstrated to the satisfaction of the Department that:
(A)other siting, technological, and managerial options that would avoid the need for a lake mixing zone are not reasonably achievable;
(B) overriding considerations of the public interest and the Tribe will be served; and,
(C) all technological and managerial methods available for pollution reduction and removal that are economically achievable would be implemented prior to the discharge. Such methods may include, but not be limited to, advanced waste treatment techniques.

(j) The Department shall consider prohibiting mixing zones under the following circumstances:
(A) where discharges could create or foster conditions in sediments within and outside of the mixing zone that have the reasonable potential to cause damage to the ecosystem;
(B) for known or suspected carcinogens, mutagens, teratogens, or bioaccumulative or persistent pollutants;
(C)where discharges could cause an exceedance of the chronic criteria outside of the mixing zone boundary;
(D) where aquatic life could be attracted to the plume and harmed;

(E) where the mixing zone could impact drinking water intakes, recreation sites, cultural areas, and biologically important areas such as fish spawning/nursery areas; and,
(F) where the discharge could adversely impact threatened and endangered species.

(k) Mixing zones shall not be used for, or considered as, a substitute for waste treatment. The applicant shall show, to the satisfaction of the Department, that all reasonable current technology for wastewater treatment, pollution control, and waste reduction have been fully applied before a mixing zone is granted.

(l) Except as specified in "Narrative Water Quality Criteria"(section 4) water quality standards may be exceeded within the mixing zone as provided for in a discharge permit or order. Determination of the dilution available and size of mixing zones will consider the following:
(A) critical conditions;
(B) mixing characteristics of the receiving water;
(C) characteristics of the effluent; and,
(D) impacts to use classifications of the receiving water.

(m) Mixing zones shall be as small as feasible, and shall minimize the adverse effects on the indigenous biological community, especially when species are present that warrant special protection for their cultural significance, economic importance, ecological uniqueness, or for other similar reasons as determined by the Department.

(n) Where mixing zones are adjacent or overlapping, the total size of all mixing zones shall not exceed the size allowed for one mixing zone.

(2) Critical Design Flows

Mixing zone specifications and water quality-based effluent limits shall be based on the following critical design flows:
(A) chronic criteria: the 7Q10 flow
(B) acute criteria: 1Q10 flow or at the point of discharge
(C) human health criteria - carcinogens: harmonic mean flow
(D) health criteria - non-carcinogens: the 30Q5 flow
(E) ammonia – 30B4 (in accordance with EPA-822-R-99-014 Dec 1999)

13. IMPLEMENTATION

(1) The requirements of these water quality standards shall be met for Reservation TAS Waters with approved water quality standards. No person shall engage in any activity that violates or causes the violation of these standards. All discharges from point sources, all in-stream activities and all activities which generate nonpoint source pollution shall be conducted so as to comply with this chapter. Compliance shall be determined by the Department.

(2) All permits issued or reissued (upstream of, or creating a direct impact to Reservation TAS approved waters), and all activities undertaken by the Tribe, the U.S. Environmental Protection

Agency, the Bureau of Indian Affairs, the U.S. Army Corps of Engineers, the Federal Energy Regulatory Commission (FERC), state agencies, or any other government agencies or commissions shall be conditioned in such a manner as to authorize only activities that will not cause violations of this chapter. Permits may be subject to modification by the permitting authority whenever it appears to the Department and/or the permitting authority that the activity violates water quality standards.

(3) Best management practices shall be applied so that when all appropriate combinations of individual best management practices are utilized, violation of water quality criteria shall be prevented. If a person is applying all best management practices appropriate or required by the Department and a violation of water quality criteria occurs, the person shall modify existing practices or apply further water pollution control measures, selected or approved by the Department, to achieve compliance with water quality criteria. Best management practices established in permits, orders, rules or directives shall be reviewed and modified by the Department, as appropriate, to achieve compliance with water quality criteria.

(4) Activities which cause pollution of stormwater shall be conducted so as to comply with the water quality standards. The primary means to be used for requiring compliance with the standards shall be through best management practices required in waste discharge permits, rules, orders, and directives issued by the Department for activities which generate stormwater pollution.

(5) Sample collection, preservation, and analytical procedures to determine compliance with these standards shall conform to the guidelines of 40 CFR, Part 136, and with the Coeur d'Alene Tribe's Quality Assurance Project Plan (QAPP) for Nonpoint Source and Point Source Pollution Monitoring and Water Quality Standards Implementation Monitoring (approved by EPA in October, 2003). If guidance does not exist, procedures shall conform with other methods accepted by the scientific community and deemed appropriate by the Department.

14. ENFORCEMENT

This Chapter shall be enforced through all methods available to the Department.

15. ALLOWANCE FOR COMPLIANCE SCHEDULES

(1) NPDES permits issued under federal or tribal authority, and orders and directives of the Department issued under tribal authority for existing discharges or activities may include a schedule for achieving compliance with water quality criteria contained in this chapter. Such schedules of compliance shall be developed to ensure final compliance with all water quality criteria in the shortest practicable time, but not to exceed five years. Decisions regarding whether to issue schedules of compliance will be made on a case-by-case basis by the permitting agency and must be approved by the Department. Schedules of compliance may not be issued for new discharges or activities. Schedules of compliance may be issued to allow for:

(a) construction of necessary treatment capability;
(b) implementation of necessary best management practices;
(c) implementation of additional best management practices for sources determined not to meet water quality criteria following implementation of an initial set of best management practices; and,
(d) completion of necessary water quality studies.

(2) For the period of time during which compliance with water quality criteria is deferred, interim limitations and/or other conditions may be formally established, based on the best professional judgment of the permitting agency and the Department.

(3) Prior to establishing a schedule of compliance, the permitting agency shall require the permittee to evaluate the possibility of achieving water quality criteria via non-construction changes (e.g. facility operation, pollution prevention).

16. SHORT-TERM EXCEEDANCES

(1) The criteria established in these standards may be modified for a specific water body on a short-term basis in order to respond to emergencies, to accommodate essential activities, or to otherwise protect the public health and welfare, even though such activities may result in a temporary reduction of water quality conditions below those criteria established by this regulation. Such modifications shall be issued in writing by the Director, subject to such terms and conditions as he/she may prescribe.

(2) Short-term exceedances shall not exceed a thirty day period and shall be kept as short as feasible.

(3) In no case will any degradation of water quality or aquatic habitat be allowed if this degradation could interfere with, or becomes injurious to, existing water uses or causes long-term harm to the environment or cultural resources. No short-term exceedance may be issued where it could adversely impact threatened or endangered species or their critical habitat.

(4) A request for a short-term exceedance shall be made, in writing, to the Department. Such requests shall be made at least thirty days prior to the start of the activity impacting water quality, unless the exceedance is in response to an emergency requiring immediate attention in which case notification shall be provided within twenty-four hours of the response decision.

(5) Aquatic application of all pesticides shall require a short-term exceedance be granted prior to application. These modifications shall include, at a minimum, the following conditions:
(a) Such pesticide application shall be in accordance with all federal, tribal and local regulations; and,
(b) Such application shall be in accordance with label provisions promulgated by EPA under the Federal Insecticide, Fungicide, and Rodenticide Act, as amended (7 U.S.C. 136, et seq.); and,
(c) Such application shall not result in conditions injurious to indigenous aquatic biota, wildlife, humans, cultural resources, or other existing or designated uses of the water body; and,

(d) Public notice, including identification of the pesticide, applicator, location where the pesticide will be applied, proposed timing and method of application, and any water use restrictions shall be provided by the applicator; and,
(e) The Department shall be notified at least three business days prior to pesticide application; and,
(f) Any additional conditions required by the Department.

(6) In the event of any fish kills or other harm to indigenous aquatic dependent resources, the Department shall be notified within three hours.

17. PUBLIC INVOLVEMENT

From time to time, but at least once every three years (or whenever revisions to the standards are deemed necessary or mandated by EPA), the Department shall hold public hearings for the purpose of reviewing the water quality standards and, as appropriate, modifying and adopting standards. The Department will issue public notice of proposed changes and provide opportunity for public comment. Public participation, including time periods for public notice and commenting, will follow federal regulations for public participation in programs under the Clean Water Act defined in 40 CFR Part 25. The Tribe will submit all revisions to these standards to EPA for review.

18. WATER USE CLASSIFICATION

Water quality standards regulations require the Tribe to specify appropriate water uses to be achieved and protected. Section 131.10 of 40 CFR requires that Tribes take into consideration the use and value of water for public water supplies; protection and propagation of fish, shellfish, and wildlife, recreation in and on the water, agricultural, industrial, and other purposes including navigation. The Tribe must also take into consideration the water quality standards of downstream waters, and ensure that its water quality standards provide for the attainment and maintenance of the water quality standards of downstream waters.

The designated uses for which Reservation TAS Waters are to be protected include, but are not limited to, the following:

(1) Domestic Water Supply. Surface waters which are suitable or intended to become suitable for drinking water supplies.

(2) Agricultural Water Supply. Surface waters which are suitable or intended to become suitable for the irrigation of crops or as drinking water for livestock.

(3) Recreational and Cultural Water Uses. Surface waters which are suitable or intended to become suitable for prolonged intimate contact by humans or for activities where the ingestion of small

quantities of water is likely to occur. Such waters include, but are not restricted to, those used for swimming, wading, fishing, boating, or for ceremonial or cultural purposes.

(4) Aquatic Life Uses

(a) Bull Trout and Cutthroat Trout. Surface waters used for, or naturally suitable as habitat for bull trout and cutthroat trout.

19. SPECIFIC WATER QUALITY CRITERIA FOR USE CLASSIFICATIONS

(1) Domestic Water Supply. Waters designated for domestic water supply are subject to the following criteria:

(a) Turbidity. Turbidity shall not exceed 1 NTU (Nephelometric turbidity unit) over natural background levels when the natural background turbidity is 10 NTU or less, or have more than a 10 percent increase in turbidity when the natural background level is more than 10 NTU. Natural background turbidity for implementing this criteria is to represent the 90th percentile value of the annual average turbidity.
(b) pH. pH shall be within the range of 6.5 to 8.5, with a human caused variation within this range of less than 0.5 units over any 24 hour period.
(c) Alkalinity. Alkalinity should generally be maintained within the range of 50 to 120 mg/L. Variations outside this range are to be avoided where practical alternatives exist.
(d) Bacterial Waste. Livestock, pet, and human sewage are not allowed to drain or be discharged into Reservation TAS Waters unless controlled or treated with best management practices or waste treatment technology appropriate and approved by the Tribe or the U.S. Environmental Protection Agency.
(e) Total Dissolved Solids. Total dissolved solids shall not exceed 500mg/L

(2) Agricultural Water Supply. Waters designated for agricultural water supply are subject to the following criteria:

(a) Electrical Conductivity. Electrical conductivity is not to exceed an arithmetic mean of 700 microsiemens per centimeter during periods when the surface water is used an agricultural water supply, based on a minimum of three samples.
(b) Total Suspended Solids. The concentration of total suspended solids is not to exceed an arithmetic mean of 75 mg/L during periods when the surface water is used an agricultural water supply, based on a minimum of three samples.
(c) pH. pH shall be within the range of 6.5 to 8.5, with a human caused variation within this range of less than 0.5 units over any 24-hour period.
(d) Bacterial Waste. Livestock, pet, and human sewage are not allowed to drain or be discharged into Reservation TAS Waters unless controlled or treated with best management practices or waste treatment technology appropriate and approved by the Tribe or the U.S. Environmental Protection Agency.

(3) Recreational, and Cultural Water Uses.

(a) Waters designated for recreational and cultural use shall not contain concentrations of *E. coli* bacteria exceeding a 30-day geometric mean of 126 per 100 ml, based on a minimum of 5 samples, and a single sample maximum of 235 colonies/100ml.
Waters designated for recreation and cultural use are not to contain E.coli bacteria significant to the public health in concentrations exceeding:
(b) For areas within waters designated for recreational and cultural use that are additionally specified as public swimming beaches, a single sample of two hundred thirty-five (235) E. coli organisms per one hundred (100) ml. For the purpose of this subsection, "specified public swimming beaches" are considered to be indicated by features such as signs, swimming docks, diving boards, slides, or the like, boater exclusion zones, map legends, collection of a fee for beach use, or any other unambiguous invitation to public swimming. Privately owned swimming docks or the like which are not open to the general public are not included in this definition.
(c) For all other waters designated for recreational and cultural use, a single sample of four hundred six (406) E.coli organisms per one hundred (100) ml; or
(d) A geometric mean of one hundred twenty-six (126) E.coli organisms per one hundred (100) ml based on a minimum of five (5) samples taken every three (3) to five (5) days over a thirty (30) day period.

(4) Aquatic Life Uses. Waters designated for specific aquatic life uses are subject to the following criteria.

(a) Bull Trout and Cutthroat Trout.

(i) pH. pH shall be within the range of 6.5 to 8.5, with a human caused variation within this range of less than 0.5 units over any 24-hour period.

(ii) Dissolved Oxygen. Dissolved oxygen (DO) shall exceed 8.0 mg/L at all times. From June 1 to September 30 DO shall be determined by natural conditions at the time of stratification. In the event natural conditions are less than 8mg/L at the time of stratification the natural condition found at that time (for that time period only) will become the standard.

(A) Natural Conditions for DO and Temperature. When TAS waters stratify (usually in June) the average whole water column DO content and temperature at the time of stratification shall be considered the natural condition (for DO and temperature only)
(B) In TAS waters greater than 15 meters this standard applies to the bottom (deepest) 80 percent of the water column present below the metalimnion. In TAS waters less than 15meters and greater than 8 meters this standard applies to only the bottom 50 percent of the water column present below the metalimnion. TAS waters exhibiting total water column depths less than 8 meters are not expected to maintain a stable stratified condition and are therefore exempt from this standard

(iii) Temperature. From June 1, through September 30, The 7-day average of the daily maximum temperatures within the hypolimnion is not to exceed 16° C from June 1 to September 30.

In thermally stratified TAS waters the hypolimnetic temperature shall be determined by natural conditions as defined in Chapter 4, (a), (ii), (A) of these standards. In TAS waters greater than 15 meters this standard applies to the bottom 80 percent of the lake water column present below the metalimnion. In TAS waters less than 15 meters and greater than 8 meters this standard applies to only the bottom 50 percent of the water column present below the metalimnion. TAS waters exhibiting total water column depths less than 8 meters are not expected to maintain a stable stratified condition and are therefore exempt from this standard

(iv) Turbidity. Turbidity shall not exceed 5 NTU over natural background levels when the natural background turbidity is 50 NTU or less, or have more than a 10 percent increase in turbidity when the natural background level is more than 50 NTU. Natural background turbidity for implementing this criteria is to represent the 90th percentile value of the annual average turbidity.

20. GENERAL CLASSIFICATIONS

All Reservation TAS Waters shall be designated, at a minimum, for the protection of Bull Trout and Cutthroat Trout and for recreational and cultural uses, unless a Use Attainability Analysis has first been performed in accordance with water quality standards regulations at 40 CFR 131.10(g). All surface waters not specifically classified in Section 21 shall be designated for aquatic life uses and for recreational and cultural uses. Unclassified Reservation TAS Waters must be of sufficient quality to ensure that downstream uses are fully protected. All Reservation TAS Waters shall be designated for the uses of industrial water supply, aesthetics, and wildlife habitat. Water quality criteria for those uses will be generally satisfied by implementation of the General Conditions in Section 3, and the Narrative Criteria in Section 5.

21. SPECIFIC CLASSIFICATIONS

Specific classifications for Reservation TAS Waters:

Water Body Name	**Class**
Lake Coeur d'Alene	1,3,4a
St. Joe River	1,2,3,4a

Use Classification Key:	
Domestic Water Supply	1
Agricultural Water Supply	2
Recreational and Cultural Use	3
Aquatic Life Uses	4
	4a: Bull Trout and Cutthroat Trout